REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

(1)

AD-A263 251

...ion is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, ...pleting and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this ...ducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson ... and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

2. REPORT DATE April 1990

3. REPORT TYPE AND DATES COVERED Final

4. TITLE AND SUBTITLE
Archaeological Data Recovery By Controlled surface collection in the Portion of 23SO496 To be Adversely Affected by the Castor River Enlargement Project, Stoddard County, Missouri

5. FUNDING NUMBERS
DACW66-88-C-0061

6. AUTHOR(S)
Robert H. Lafferty III
Michael C. Sierzchula

DTIC
S ELECTE D
APR 20 1993
B

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Mid-Continental Research Associates, Inc.

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Dept. of the Army
Memphis District Corps of Engineers
B-202 Clifford Davis Federal Bldg.
Memphis, TN 38103

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
225

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Unlimited

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Archaeological data recovery was conducted. The analysis of the assemblages indicates use of the site from Early Archaic through Mississippian times.

93 4 19 013

93-08115

174PG

14. SUBJECT TERMS

15. NUMBER OF PAGES 176

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

225

ARCHEOLOGICAL DATA RECOVERY BY CONTROLLED SURFACE COLLECTION IN THE PORTION OF 23SO496 TO BE ADVERSELY AFFECTED BY THE CASTOR RIVER ENLARGEMENT PROJECT, STODDARD COUNTY, MISSOURI

by

Robert H. Lafferty III

and

Michael C. Sierzchula

MCRA Report No. 89-9

April 1990

FINAL REPORT

Report prepared by Mid-Continental Research Associates, Inc.
for the Memphis District, Corps of Engineers in accordance with
Purchase Order No. DACW66-88-C-0061

Watershed: Lower St. Francis
USGS Quadrangle: Bloomfield 7.5'

ARCHEOLOGICAL DATA RECOVERY BY CONTROLLED SURFACE COLLECTION IN THE PORTION OF 23SO496 TO BE ADVERSELY AFFECTED BY THE CASTOR RIVER ENLARGEMENT PROJECT, STODDARD COUNTY, MISSOURI

by

Robert H. Lafferty III

and

Michael C. Sierzchula

MCRA Report No. 89-9

April 1990

FINAL REPORT

Report prepared by Mid-Continental Research Associates, Inc. for the Memphis District, Corps of Engineers in accordance with Purchase Order No. DACW66-88-C-0061

Watershed: Lower St. Francis
USGS Quadrangle: Bloomfield 7.5'

ABSTRACT

Archeological data recovery by controlled surface collection was conducted at site 23SO496 by Mid-Continental Research Associates, Inc. for the Memphis District, Corps of Engineers. The controlled surface collection was made in the impact zone that will be adversely affected by equipment tracking over the site when the river is enlarged. The controlled surface collection precisely defined three edges of the site. The analysis of the assemblages indicates use of the site from Early Archaic through Mississippian times. The primary use of the site was for procurement of Crowley's Ridge chert gravels. Comparisons to the assemblages recovered at the County Line site and upland chert procurement sites suggest that the main objective of the procurement was for cores, which were further reduced elsewhere.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

by

Robert H. Lafferty III

Archeological data recovery was undertaken at site 23SO496 by Mid-Continental Research Associates, Inc. (MCRA) for the Memphis District, Corps of Engineers (COE), in the Castor River Enlargement Project. A controlled surface collection (CSC) mitigated the anticipated adverse effects of the enlargement project caused by tracking equipment. This site previously had been determined to be significant in terms of Criterion d of the National Register of Historic Places (NRHP) as specified in 36 CFR 60 (Federal Register 1976:1595). This mitigation will keep the COE in compliance with federal laws and regulations designed to protect these fragile and often subtle resources.

Such laws and regulations include: National Historic Preservation Act of 1966 (P. L. 89-665); The National Environment Policy Act of 1969; Executive Order 11593, "Protection and Enhancement of the Cultural Environment," (Federal Register 1971:3921); Preservation of Historic and Archeological Data, 1974 (P.L. 93-291); and the President's Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties (36 CFR 8, Part 800 Federal Register 1976). These laws and regulations in effect in Missouri (Weichman 1978, 1979; Weston and Weichman 1987) mandate that archeological and historic properties be identified and tested before any federally-funded project is consummated. If such testing identifies significant properties, a plan be must be developed to mitigate the project's impacts.

The Castor River Enlargement Project involves cleaning and contouring the Castor River to improve drainage. Clearing means removing logs and vegetation which slow drainage. Contouring means removing sand bars from the stream. Impacts to archeological sites will result from tracking equipment over their surfaces. In 1985 MCRA (Lafferty et al. 1985) tested six cultural resources identified in the Phase I survey and testing project conducted by Iroquois Research Institute (IRI 1978). Two of these sites were determine to be significant. This report presents the activities carried out to mitigate the adverse impact to one of these significant resources.

PROJECT LOCATION

The Castor River Enlargement Project is located in the center of Stoddard County, Missouri (Figure 1). At this location the Castor River has cut through Crowley's Ridge to join the Western and Eastern Lowlands of the Mississippi River. This has resulted in a slow rate of incision and deposition, which have implications for the nature of the archeological resources (Chapter 2). Crowley's Ridge has been an important land transportation route for access to the Central Mississippi Valley (Lafferty et al. 1985; Dekin et al. 1978), and is an important source of lithics for adjacent lowlands. The Castor River Gap, on the other hand is one of only three places where river channels have cut Crowley's Ridge. The next closest is the St. Francis ca. 30 miles to the south on the Arkansas-Missouri border, and the third is the L'Anguille River at the south end of the ridge. These and other related factors make the project area an important transportation juncture with cultural and ecological borders present at different times (Chapters 2 and 3). The unique lithic resource availability makes this location a priori important to the whole region (Chapters 2 and 3).

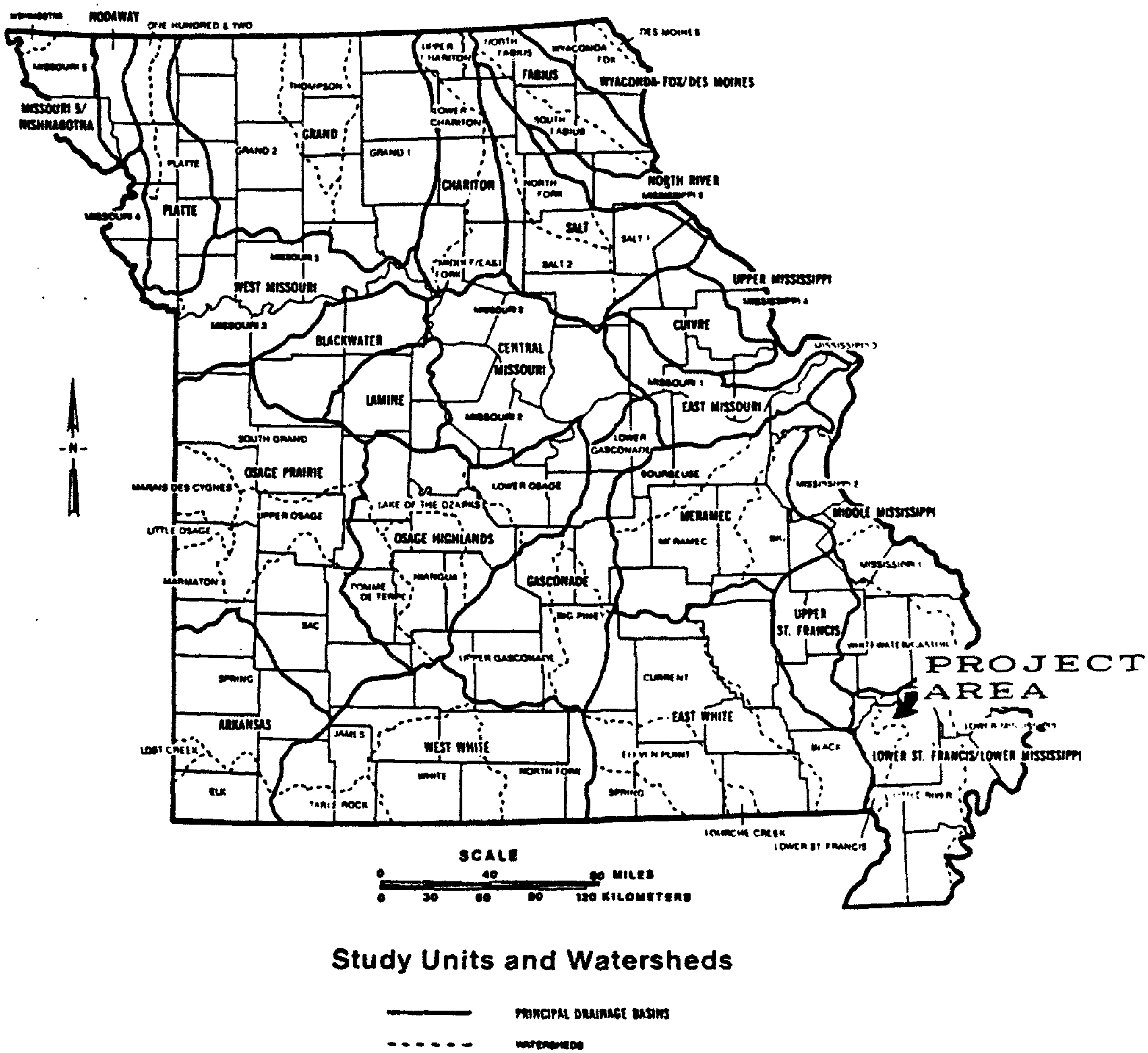


Figure 1. Project area location.

PROJECT HISTORY

The contract was awarded on May 27, 1988 with the intention to begin field work within 10 days. But unseasonably wet weather and severe flooding in all lowland areas of the Bootheel delayed the project. Specific site conditions were checked on June 6, 1988 by Michael Sierzchula, who found most areas to be investigated under water with flocks of ducks swimming over them. By July the water had receded, however, the corn was 10 feet high and a heat wave was in progress with temperatures topping 100 degrees Fahrenheit in the shade. The controlled surface collection (CSC) was made between July 4-7, 1988, during the hottest field conditions ever experienced by the author or his intrepid crew: Michael C. Sierzchula, Robert F. Cande, Michael Chapman and Teresa Turk. On the day we anticipated completing the CSC, field work was abruptly terminated by a massive thunderstorm that turned the plowzone to liquid mud. We trekked into the site with tremendous difficulty to attempt collecting. It was impossible, so we returned to MCRA headquarters and waited for the field to dry. A week later Sierzchula and Chapman returned to the field and completed the CSC in two days.

Laboratory analysis and processing of artifacts was conducted between July 31, 1988 and September 35, 1989 by Tracy Oates, Teresa Turk, and Coleen Vaughn, under the direction of Kathleen Hess. Artifacts were processed according to the curation standards of the Division of American Archeology, University of Missouri, Columbia, which will curate the artifacts and records for the United States Government. The methods and results of this analysis are presented in Chapters 4, 5, and 6.

REPORT

This report outlines the environment of the site, placing the Castor River Gap in its regional perspective (Chapter 2). Chapter 3 summarizes what is know of the archeology of the Central Mississippi Valley, with particular emphasis on sites with comparable data bases (i.e. controlled surface collections). The fourth chapter summarizes the testing data, which contained a wide range of diagnostic artifacts. Chapter 5 presents the method used in making the collection and explains in detail the nature of the CSC grid. The last chapter presents and analyzes the CSC data.

CHAPTER 2

ENVIRONMENT

by

Robert H. Lafferty III

The environment of the Castor River Enlargement Project is one of the most unusual depositional environments the author has ever encountered. The headwaters of the Castor River are located above the Western Lowlands of the Mississippi River which are nearly as low laying as the discharge point in the Mississippi River (Figure 2). Before cutting Crowley's Ridge the larger sediments (i.e. sand) are deposited in the Advance Lowlands. This makes the sediments available for deposition particularly fine grained in the Castor Gap. Moreover, the major source area for sediments – the Advance Lowlands – are composed of fine sediments, making the depositional regime very fine grained.

PHYSIOGRAPHIC ENVIRONMENT

The Castor River Enlargement Project area is located in the Castor River Gap, incised into Crowley's Ridge. The Castor River is the northernmost river of three that join the Western and Eastern Lowland physiographic region, part of the St. Francis Basin of the Central Mississippi River Valley (Figure 2; Morse and Morse 1983). The St. Francis River cuts through Crowleys Ridge near the Arkansas-Missouri border. The L'Anguille River cuts through Crowley's Ridge northwest of Helena, Arkansas before emptying into the Mississippi. This portion of the Mississippian Embayment is a deeply incised canyon, which has alluviated since the beginning of the Holocene. The Mississippi Valley, 80 miles wide at the project area, is divided about in half by Sikeston Ridge (Medford 1972:69). Crowley's Ridge separates the western quarter of the valley and defines the old Mississippi River course. The Castor Gap is one to two miles wide and cuts 15 miles through Crowley's Ridge. The Castor River has its headwaters in the St. Francis Mountains 45 miles to the northwest.

The Mississippi River has formed the structure of the environment, first by carving this great valley, and more recently by depositing nearly a mile of fine-grained alluvium within its confining rock walls. The alluvium is largely free of rock and stone with the largest common sediment size being sands deposited in the alluvial levees. This has resulted in the formation of some of the world's best and most extensive agricultural land, which has virtually no hard rocks or minerals. Prehistorically, and even today, rocks and minerals had to be imported from the surrounding regions, especially Crowley's Ridge.

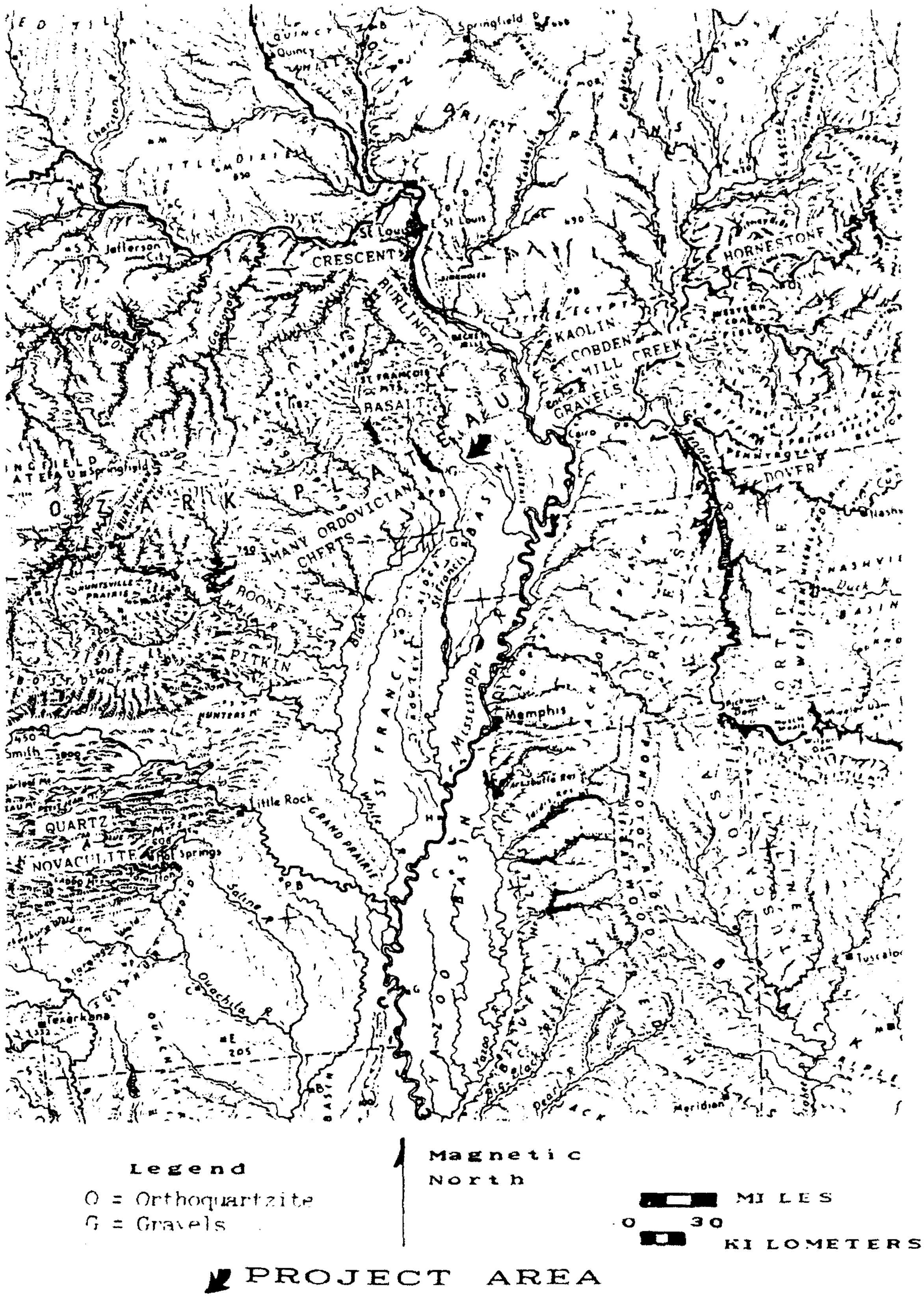


Figure 2. Central Mississippi River Valley physiography and major important lithic sources (after Raiez 1978).

Crowley's Ridge was laid down in Tertiary and Cretaceous times as terraces of the Mississippi River and the Ohio River. At that time the Ohio River had not been captured by the Mississippi and it occupied the Eastern Lowlands, while the Mississippi occupied the Western Lowlands. North of the St. Francis River, the terraces overlay limestone which is visible as weathered limestone spires in a few road cuts at the extreme north end of the ridge. The upper terraces were laid down by rapidly moving water and contain many cobbles of virtually every kind of hard-grained stone occurring in the whole Mississippi Basin. These were important resources for the Stone Age peoples of the lowlands.

The modern topography is a product of glacial meltwater during the Pleistocene. These changes were complex and are not completely understood, dated, or agreed upon. The events of the Nebraskan, Kansan, and Illinoisan glaciations and Interglaciars are especially obscure in the Bootheel region, having been dissected and/or masked by the Wisconsin age events or sediments, respectively. During the first part of the Pleistocene it is believed that the Mississippi was on the west of Crowley's Ridge and the Ohio on the east.

Two advances and retreats of the Wisconsin glacier have been identified. The earliest retreat took place ca. 90,000 B.P. and the Mississippi laid down massive amounts of alluvium in the Western Lowlands. The Ohio, at that time presumably flowing through the Cache Valley, laid down Sikeston Ridge (Saucier 1974). Once again the massive ice sheets advanced, and the outwash slackened until ca. 20,000 B.P. The glaciers again began melting, and recent data suggest that some stages of the melting resulted in catastrophic flooding (Monestesky 1989:213). In the upper Mississippi Valley where the river was confined between the canyon walls, its speed was apparently fast enough to transport cobbles. When this massive flood reached the Saint Francis Valley where the valley doubled in size, a great mass was deposited around Puxico, forming a dam and creating a lake from Cape Giradeau to Puxico, a distance of 50 miles (Hawker 1987:60). This is evidenced by the fact that the average valley floor elevation is 340 feet above mean sea level (AMSL) at Puxico, Cape Giradeau, and the Castor Valley. Just below Puxico the valley floor drops to 325 feet AMSL with a 50-foot drop in elevation between Poplar Bluff and Pocahontas, 50 miles away.

The lake overtopped Crowley's Ridge, cut both the Castor River Valley and, later, the major cut of what was to become the Morehouse Lowlands, and began the braided regime which laid down the terminal Pleistocene alluvium of the Malden Plain and Morehouse Lowlands. The final major change in the topography of Crowley's Ridge was the topping of the ridge at Thebes Gap and the capturing of the Ohio near Cairo. It is possible that this topping was the result of a meltwater surge, perhaps from Lake Agassie, which deposited the Charleston Delta on the east side of Sikeston Ridge. After this final outpouring of water and debris, the glacial retreat had moved so far north that it was beyond the Mississippi Basin. Slowly, the dusty braided surface changed to a meandering regime and vegetation became established.

The Mississippi River has also structured, and continues to structure, the transportational environment. The dominant direction of its movement from north to south has resulted in making resources upstream more accessible than those to the east or, especially, to the west. For example, in order to cross the valley at 36 degrees north latitude one must traverse three major rivers in addition to the Mississippi itself: the St. Francis, the Cache and the Black, all former channels of the Mississippi River in post-Pleistocene times. In pre-automobile times, this was a tedious overland journey of 80 miles which involved crossing many bodies of water. This contrasts with 100 miles of floating downhill on the surface of the river. The river is still a major transportation artery for the central part of the continent, and in earlier times it was the only way to easily traverse this lowland region. In 1840-1843 when the General Land Office (GLO) maps were made, all of the mapped settlements in the project area were positioned along the river.

The central Mississippi River Valley is incised into the Ozark and Cumberland Plateaus (Figure 3). These coordinate proveniences were uplifted from the south by a tectonic plate movement from the southeast which pushed up the Ouachita Mountains and split the lower part of the Ozark-Cumberland plateau. At the time of this tectonic event, ca. 100 million years ago, these plateaus were inland seas with beachlines along the present course of the Boston Mountains in Central Arkansas and Sand Mountain-Walden Ridge in Alabama and Tennessee. These ancient sea beds are today limestones filled with many different kinds of cherts. While these cherts come from several different formations, there is a great deal of variation within formations, which is made more confusing by the tendency for these formations to have different names in different states. For example the Boone, Burlington and Fort Payne "formations" are different names applied to the same formation in Arkansas, Missouri, and Tennessee, respectively. There is a great deal of variation present within this structure, and more formations than the above contain usable cherts. Figure 2 shows the source area of some of the more important lithic resources. Some of these have well known source areas, such as Dover, Mill Creek, Crescent and Illinois Hornstone. Other lithic resources occur over large areas and do not have known quarries, though they may exist (Butler and May 1984).

Making the identification of these lithic resources more complex is the presence of Tertiary gravel beds around the edges of the Mississippian Embayment, on Sikeston and on Crowley's Ridge. Crowley's Ridge is perhaps the most important of these because it occurs in the center of this stoneless plain. This deposit was lain down in Pliocene times when the river gradient was steeper than it is today. This deposit has virtually every heavy hard kind of mineral which occurs in the Mississippi River Basin. Prehistoric sites on the edge of the Western Lowlands, even those situated directly on the Grandglaise Terrace, show a marked preference for the lithics found in the Ozarks over those of the terrace (eg. 3IN17, Lafferty et al. 1981). Much of the gravel deposits adjacent to the Mississippi Valley to the east is covered with Loess deposits up to 200 feet thick. Investigations have shown that, as one approaches Crowley's Ridge from both the east and the west, there is a marked increase in the occurrence of cobble chert on prehistoric sites (Shaw 1981). This is generally true even though, through time, there are documented changes in the prehistoric utilization of different lithic resources (Hemmings 1982; Lafferty 1984). Crowley's Ridge is currently the main source of gravel for both the Eastern and Western Lowlands. The rather intensive modern day use of gravel sometimes makes the identification of aboriginal tools from "gravel crusher-produced artifacts" difficult. Since the Castor River was one of only three rivers to cut through Crowley's Ridge, we would expect this to be a major lithic source area. Because it was, and still is, navigable by small craft, and because the river abuts the ridge and erodes the gravel deposits, these are more accessible than at other smaller streams which have their source on the ridge.

One important class of lithic resources was the volcanic materials, particularly the basalts (for axes) which were obtained in the St. Francis Mountains. Also of importance from this quarter were ryolite and orthoquartzite, which were used for various tools (Price and Price 1984:40-43; Morse and Morse 1983). The Castor River has its source in these deposits and the presence of both of these kinds of resources is to be expected on archeological sites.

When De Soto and his men reached the Great River in 1541 they looked upon a great transportation artery that stretched from the Gulf of Mexico to the heart of the continent. However, it was navigated and controlled by native Americans in fleets of dugout canoes who both harassed and assisted the Spanish over the next several years. As they looked from the bluffs over the swampland of virgin forest, the Spaniards never suspected that they were gazing upon both the graveyard and salvation of their expedition. Most of the next two months found them slogging through one of the most difficult swamps encountered in the entire expedition: the St. Francis Sunk Lands (Morse 1981; Hudson 1984). However, the expedition was continually drawn back to the Great River and the high chiefdom cultures, which the Spanish dominated with the techniques used so effectively against the Aztecs and the Inca. The swampy lowlands impeded the expedition particularly when traversing from east to west. As the Spanish reached the Grandglaise terraces on the Ozark Escarpment, they encountered the great Toltec - Cahokia road, later to be known, sequentially, as the Natchitoches Trace, the Southwest Military Road, and, currently, U.S. Hwy. 67). This important road was on tractable ground with the swampy lowlands to the east and the more dissected plateau to the west. The expedition's speed doubled once they were on it. In the end, after many more side trips and high adventures, the hard-pressed expedition made its escape down the Great River in boats constructed with nails forged from their weapons. They were harassed by the Indians in large fleets of canoes all the way to the Gulf of Mexico.

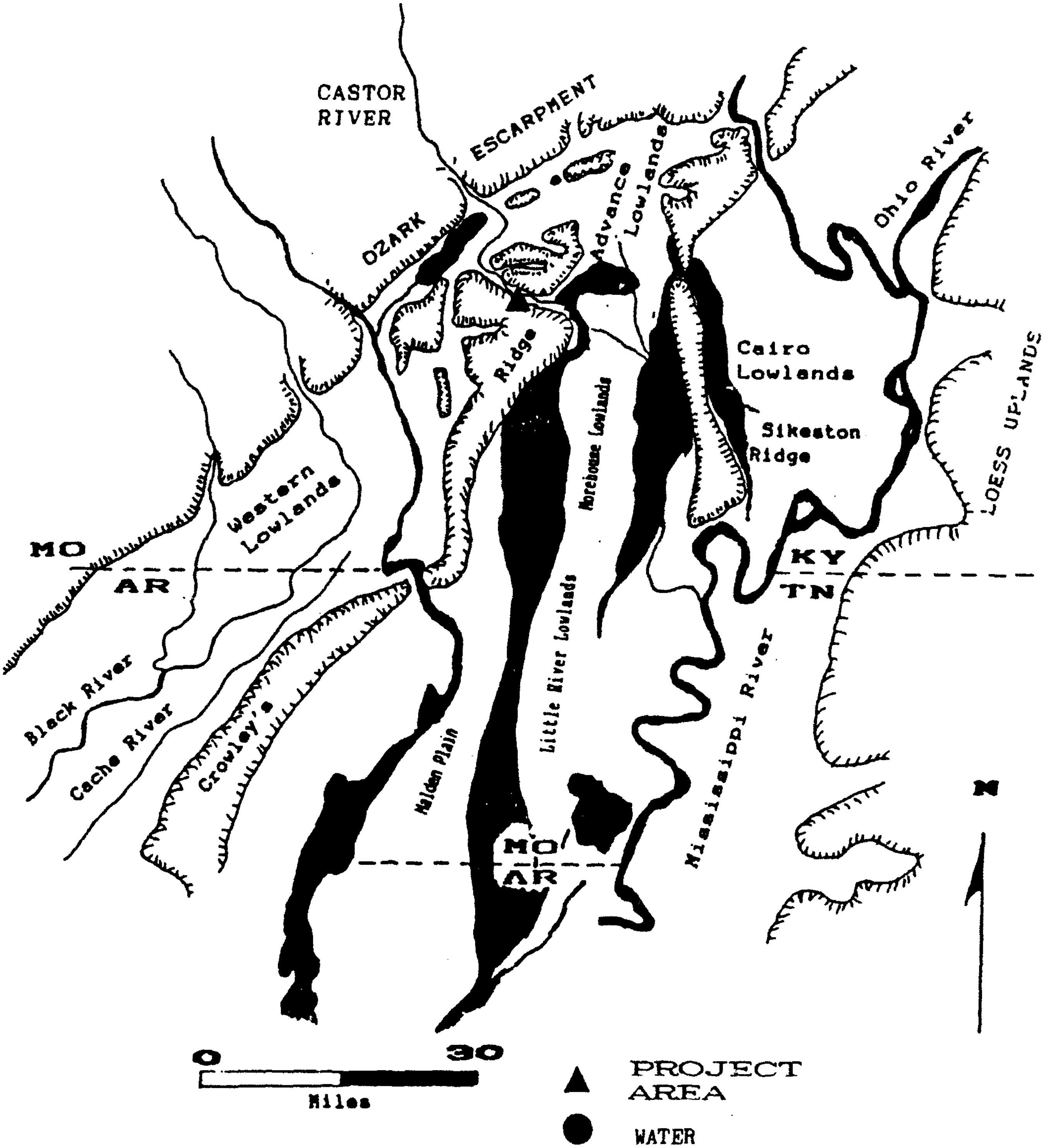


Figure 3. Major landforms in the Central Mississippi Valley area.

The early Euro-American penetration into this area followed Crowley's Ridge into the center of the Lower Mississippi Valley (Dekin et al. 1978). This was also the route of the first railroad into the valley from St. Louis. Therefore, the physiography of the Central Mississippi River has, to a large extent, dictated the nature of life in this environment. Transportation by water was much easier though sometimes it involved a longer trip, particularly the Mississippi. Overland travel was easiest by going around the lowlands or down Crowley's Ridge. Humans (*Homo sapiens*) did not penetrate or live in this environment unless they were equipped with boats, lines, and other tools with which to deal with an aquatic environment. This lowland forest was rich in plants and animals and contained some of the most productive soils on the continent. Too, there was a great profusion of mineral resources in and about the nearby uplands.

The structure of the regional physiography makes the project location the crossroads of a major north-south overland route and the only east-west *water* route in this part of the valley. It has important lithic resources which were necessary for importations to the lowlands during prehistoric times. These were probably more available here naturally than in most areas on Crowley's Ridge because of the higher erosion rate by the river.

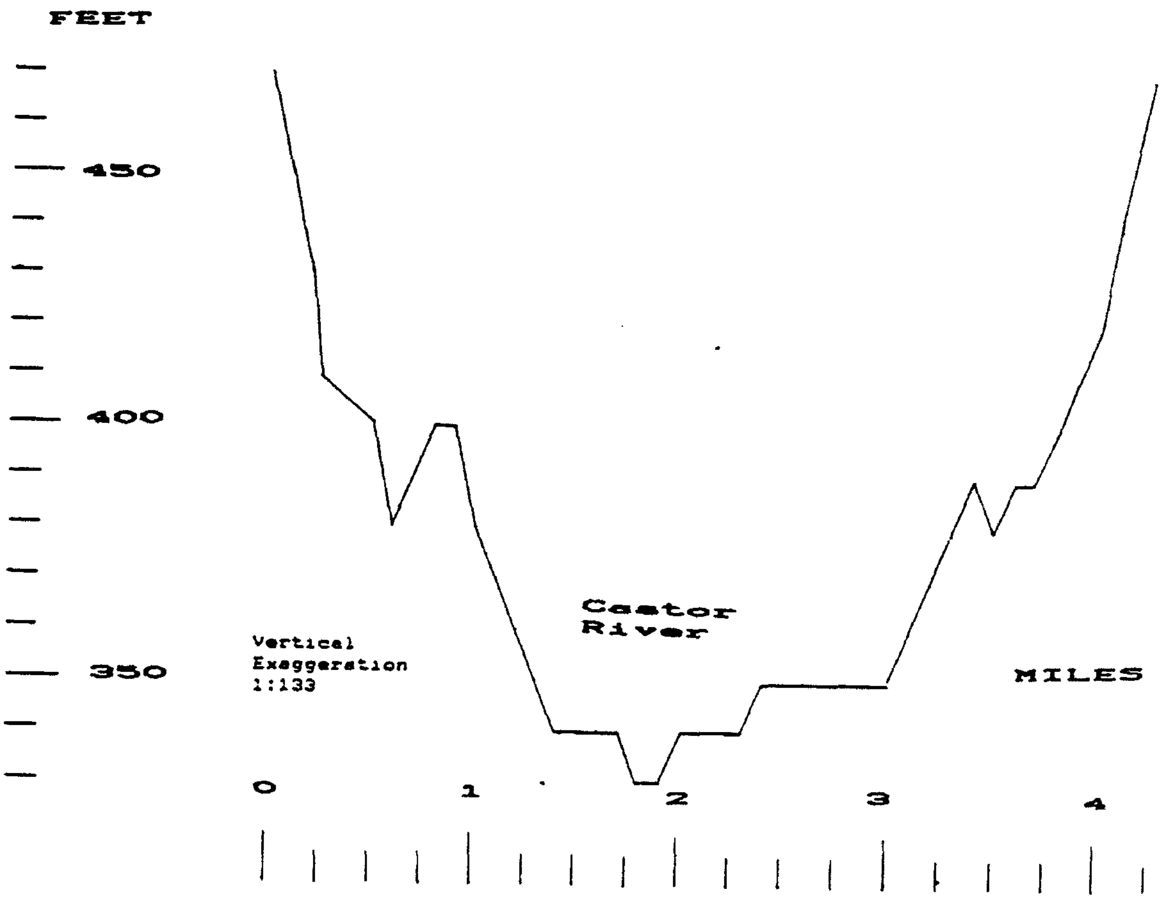


Figure 4. Physiographic cross section of the Castor River Gap.

The Castor Gap physiography is the result of the erosion Crowley's Ridge deposits during the Pliocene and subsequent deposition in the valley. The Castor River has incised over 200 feet into Crowley's Ridge (Figure 4). Fisk (1944) mapped most of the valley floor as relict braided surface. An interesting feature of this valley is that there are no mappable higher terraces than this, and all of the more recent alluviation has taken place on this surface where it abuts the river.

SOILS

The relict braided surface was laid down about 10,000 years ago by loads carried from the meltwater from the Wisconsin glaciation (cf. Saucier 1974; Morse and Morse 1983). These fine-grained deposits settled in the slow moving water of an estuary. In the Castor River Gap the size of this surface (covering ca. 90% of the valley floor, Figure 5) and its flatness (some sections have less than 10 feet of relief and appear land-leveled) indicate this has been a relatively stable surface for a long time.

The soils in this surface (mapped by the Soil Conservation Service as Crowley silt loam) are gray gleyed clays. These have very shallow plowzones (8-12 cm) except where they are near the present course of the river. Also, coarser-grained silts have been deposited on top of them. The plowzones are browner than the subsoils. Many of the test units excavated in this project contained significant quantities of iron concretions (bog iron) which form under periodically water-logged conditions. In several of our test units these measured greater than 1/4 inch in diameter!

A soils manual had not been published for Stoddard County at the time controlled surface collections were conducted at 23SO496. Advance soils maps were obtained for the project area and the description of the soils present were obtained from the Dunklin County soils manual (Gurley 1979). Two soils were identified within the project area. These are Crowley silt loam and Falaya silt loam (Figure 5).

Crowley silt loam belongs to the Crowley-Calhoun-Foley soil association. The majority of this association is west of Crowley's Ridge on abandoned flood plains and terraces. In Dunklin County this soil association is older than most alluvium (Gurley 1979: 6). Crowley silt loam is the primary soil type on which 23SO496 is located and occupies the terrace where most of the site is.

Crowley silt loam is located on drainageways, slightly concave basins, and flat terraces or benches. Somewhat poorly drained with slow surface runoff, its permeability in the subsoil is also very slow. This acidic soil occurs in areas covering 30 to several thousand acres (Gurley 1979: 17).

Falaya silt loam belongs to the Falaya-Fountain Association. This association is located adjacent to the St. Francis River and in narrow bands along Crowley's Ridge (Gurley 1979: 5-6). Falaya silt loam is located at the extreme southern portion of the site in the lower elevations.

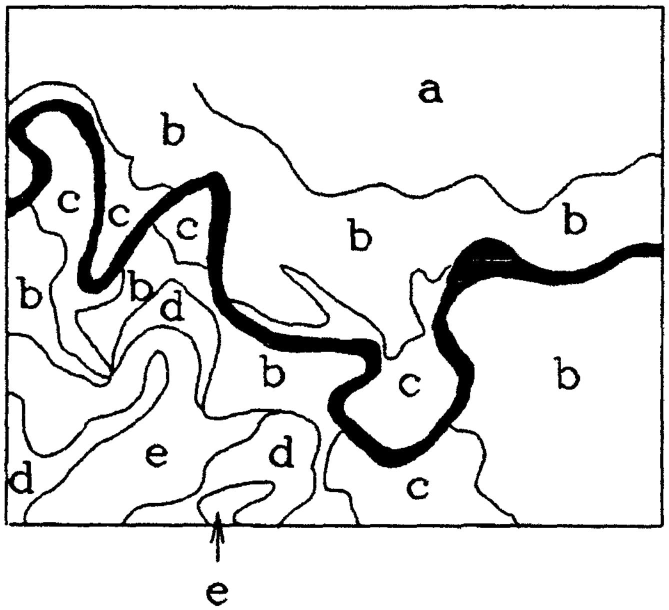
Topographically, Falaya silt loam is located on broad flats of former or active floodplains. This soil occupies areas generally elongated in shape and parallel to main streams, causing short-term flooding on occasion. Falaya silt loam is somewhat poorly drained with slow surface runoff. Due to liming practices the pH factor at the surface is neutral. However, below the surface this soil is strongly acidic. Falaya silt loam typically occurs in areas covering from 10 to 1,000 or more acres (Gurley 1979: 20-21).

SOILS AND BIOTIC COMMUNITIES

The relationship of biota to riverine features in the Lower Mississippi Valley is well known (Lewis 1974; Lafferty 1977; Butler 1978; Morse 1981). Because of the radical changes in the environment in the past century, all of these studies are reconstructions based on named witness trees in the GLO survey notes. These studies have consistently identified plant communities associated with particular soil types.

There are two plant communities associated with the levees: the Sweetgum-Elm Cane Ridge forest and the Cottonwood-Sycamore Natural Levee forest. These plant communities were the driest environments in the natural landscape and had a high potential for human settlement. These two plant communities are, in fact, successional stages, with the Cottonwood-Sycamore forest being found along active river channels, and the Cane Ridge Forest on the levees of abandoned courses.

PROJECT AREA SOILS



SCALE

Approximately One Mile

KEY

a – Roellen silty clay loam
b – Crowley silt loam
c – Falaya silt loam
d – Loring silt loam, 2 to 5 percent slopes
e – Loring silt loam, 5 to 9 percent slopes, eroded

Figure 5. Generalized soils of the central Castor Gap (based on Soil Conservation Service advance map).

There are four aquatic biotic communities: river, lake, marsh, and swamp. All are low-lying areas unsuitable for human occupation. Several are involved in successional sequences; however, since about the Middle Woodland period all were present at any given time, prior to drainage.

Between the two extremes of upland levees and aquatic communities are river edge communities and seasonal swamps. In drier times the latter contained areas suitable for occupation. The former are a line-like interface with a steep slope and little substantial flat area.

The correlation between soils and plant communities is not a 1:1 ratio. These soil deposits build up, and what was once a swamp may, in a few decades, be a dry levee. This process brings about successional biotic changes. There is, however, a high correlation between soils and last successional stage plant communities.

Research using soils and plant communities to model prehistoric occupation in northeast Arkansas (Dekin et al. 1978; Morse 1981; Lafferty et al. 1984), in the adjacent portions of the Missouri Bootheel (Lewis 1974; Price and Price 1981), and in the lower Ohio Valley (Muller 1978; Lafferty 1977; Butler 1978) have all suggested that sites are preferentially located on levee soils and are not found in aquatic deposits.

MACROBIOTIC COMMUNITIES

These three "macrobiotic" communities - levee, ecotone, and swamp, are composed of different species of plants and animals. Table 1 presents an arboreal species composition reconstructed in Mississippi County, Missouri (Lewis 1974:19-28).

Levee

The Levee macrobiotic community includes two plant communities: the Cottonwood-Sycamore community found along the active river channel and the Sweetgum-Elm Cane Ridge forest on abandoned courses. The arboreal species found in the Sweetgum-Elm community include all of the species found along the natural levee, however, their mix is considerably different. These two communities are in the highest topographic position in the county and supported a dense understory of plants including cane (*Arundinaria gigantea*), spice bush (*Lindera benzoin*), pawpaw (*Asimina triloba*), trumpet creeper (*Campsis radicans*), red bud (*Cercis canadensis*), greenbrier (*Smilax* sp.), poison ivy (*Rhus radicans*) and several less frequent herbaceous plants. Most common of these was cane, which often formed nearly impenetrable canebrakes. Canebrakes provided cover for many of the larger species of land animals and were an important source of weaving and construction material.

The major mammals in this biotic community include white-tailed deer (*Odocoileus virginianus*), cougar (*Felis concolor*), black bear (*Ursus americanus*), elk (*Cervis canadensis*), skunk (*Mephitis mephitis*), opossum (*Didelphus marsupialis*), raccoon (*Procyon lotor*), eastern cottontail rabbit (*Sylvilagus floridanus*), gray fox (*Urocyon cinereoargenteus*), and gray squirrel (*Sciurus carolinensis*). Important avian species include wild turkey (*Meleagris gallopavo*), prairie chicken (*Tympanuchus cupido*), ruffed grouse (*Linderaosnasa umbellus*), passenger pigeon (*Ectopistis migratorius*) and carolina paroquet (*Conuropsis carolinensis*).

Table 1. Arboreal Species Composition of Three Biotic Communities in Mississippi County, Missouri.

Species	Levee	Edge	Swamp
American Elm (*Ulmus* sp.)	23	19	
Ash (*Fraxinus* sp.)	11	14	2
Bald Cypress (*Taxodium distichum*	7	50	
Black Gum (*Nyssa sylvatica*)	T	1	
Blackhaw (*Viburnum*sp.)	T		
Black Walnut (*Juglans nigra*)	2		
Box Elder (*Acer negundo*)	2		
Cherry (*Prunus*sp.)	T		
Cottonwood (*Populus*sp.)	1	3	
Dogwood (*Cornus*sp.)	1		
Hackberry (*Celtus occidentalis*)	12	9	
Hickory, (*Carya* sp.)	5	4	
Shellbark (*Carya laciniosa*)	T		
Hornbeam (*Ostrya virginiana*)	2		
Kentucky Coffee Tree (*Gymnocladus dioica*)	T		
Locust, ?	T		
Black (*Robinia pseudoacac*)	T		
Honey (*Gleditsia triancan*)	T	1	14
Maple, (*Acer*sp.)	3	8	
Sugar (*Acer saccharum*)	1		
Oak, Black (*Quercus velutina*)	5	2	
Burr (*Quercus macrocarpa*)	1	3	2
Overcup (*Quercus lyrata*)	1		
Post (*Quercus stellata*)	T		
Red (*Quercus rubra*)	1	1	
Spanish (*Quercus falcata*)	1		
Swamp (*Quercus bicolor*)	T	1	
White (*Quercus alba*)	1	1	
Pecan (*Carya illinoensis*)	1	1	
Persimmon (*Diospyros virginiana*)	T	2	2
Plum (*Prunus* sp.)	T		
Red Haw (*Crataegus*sp.)	T	1	11
Red Mulberry (*Morus rubra*)	T		
Sassafras (*Sassafras albidum*)	T		
Sweetgum (*Liquidamber styraciflua*)	20	18	
Sycamore (*Platanus occidentalis*)	1		
Willow (*Silix*sp.)	1	2	18

Abbreviations: T=Trace (i.e. <1%); Data based on Lewis (1974:18-28).

Prior to artificial levee construction, the natural levees were the best farmland in this environment because they are located at the highest elevations from which spring floods rapidly receded and drained. This environment provided a large number of useful species of plants and animals, making it an attractive place for settlement at virtually all times (except during major floods) since the levees' formation.

Levee/Swamp Ecotone

This modeled macrobiotic community is what Lewis (1974:24-25) has called the Sweetgum-Elm-Cypress seasonal swamp. This ecotone had few species present at any one time and a noticeably clear understory. The arboreal species composition (Table 1) includes more water-tolerant species (cypress, willow, and red haw) and at times had aquatic animal species. These areas were flooded regularly every year for several weeks to several months, and the soils retained the moisture longer than levee soils. These locations were clearly much less desirable for occupation than the levees, but they were easy to traverse in dry periods.

Diverse fauna, drawn from the adjacent swamps and levees, occupied the area at different seasons. In addition, the giant swamp rabbit (*Sylvilagus aquaticus*) and crayfish preferred this ecotone as a habitat. It is probable that many aquatic species, such as fish, were stranded and scavenged by the forest's omnivores when this environment changed from wetland to dry open swampscape. Characteristically, the soils are poorly drained due to the presence of clays in the upper horizons. Normally aquatic trees, especially cypress, would have been exploitable in this environment with land-based technology.

Swamp

Included in these modeled strata are the different environments that were under water prior to drainage, as defined by the soils deposited in slackwater conditions. These soils occur at the lowest elevation in the project area. Before drainage the following ecozones were included under this rubric: river channels, lakes, marsh and Cypress deep swamp. These ecozones are successional stages in this environment, but all are aquatic. The Cypress deep swamp (Table 1) is only one of the three having arboreal species.

Several important herbaceous species were found in these aquatic environments. These included cattails (*Typha latifolia*), various grape vines (*Vitis* sp.), button bush (*Cephalanthus occidentalis*), and hibiscus (*Hibiscus* sp.), which was an important source of salt (Morse and Morse 1980).

The fauna of the aquatic environment were quite different from the terrestrial species, which mostly penetrated only the swamp edge. Beaver, mink, and otter were important swamp mammals. Of special interest were fish and waterfowl, abundant in this great riverine flyway. But, a means of water transportation was necessary to exploit these resources. Although dugout canoes have been dated to at least 1,000 B.C., it is likely that they may have occurred a great deal earlier.

In summary, this has been a rich environment for a long period of time. The project area contained, at different times, all of the major environments found in the Lower Mississippi Valley. During much of late prehistoric times it was on a major interface between a very large backwater swamp to the west and the well-drained Mississippi River levees. Cutting through these large scale formations is Pemiscot Bayou, whose fluviality has created smaller scale levees and swamps.

UPLAND BIOTA

The Castor River Gap has more upland species of native plants and animals than do the surrounding lowlands (cf. Fehon 1975). The Castor River has incised 10 feet into the relict braided surface. There are a few streams which have cut across the surface. Even in the more poorly drained locations, where today one sees standing water in the soybeans, prehistorically there would have been more water taken up by the canopy and roots of the trees. On several occasions during the March field work the author walked through well developed woods on this surface and found no standing water and the surface quite tractable despite water on a plowed field only five feet away. Therefore, even though this surface has the appearance of a lowland surface, it is not the flood plain of the river. Species composition in the three parcels of woods observed were typical of Oak-Hickory (*Carya sps. - Quercus sps.*) forest (Shelford 1963; Kuchler 1964) with a notable absence of Southern Flood Plain species such as bald cypress (*Taxodium distinchum*), which occurs along the river bank.

Crowley's Ridge possesses unique plant communities in the mid continent (Arkansas Natural Plan 1978). It is the western limit for certain eastern species such as the tulip poplar (*Liriodendron tulipifera*) and Beech (*Fagus grandifolia*) (Harlow and Harrar 1968:284,365). The tulip poplar was a preferred wood among the southeastern Indians for making the largest canoes (Lafferty 1977), and it would have been in high demand by the peoples of the Eastern and Western Lowlands where it did not grow.

In several conversations with local residents the author asked about flooding. No one remembered a flood in the valley. Charles Franklin Rampley, 75 years old at the time of the interview, remembered the flood of 1929 and stated that the river never rose too high in this country. At the time of the interview we were standing on the relict braided surface near a log house where his brother lived.

There is considerable evidence that the environment has undergone substantial changes through the past 10,000 years (cf. Delcourt et al. 1980). Major changes involve the general warming with the retreat of the Wisconsin glaciers, a long period of desiccation during the Middle Archaic period and since then wetter climates similar to the present. Morse and Morse (1983) have detailed these changes in the region.

Today the Castor River Valley is on the edge of one of the great agricultural areas of the world - the Mississippi River flood plain. The flat parts of the valleys have large fields of row crops growing on the white clays of the relict braided surface. These abruptly abut the orange upland soils of Crowley's Ridge at the edges of the valley. This flat surface is broken by the Castor River supporting an edge forest of cypress, sycamore (*Platanus occidentalis*), white oak (*Quercus alba*), black oak (*Quercus velutina*), and poison ivy (*Rhus radicans*). There are still a few hundred acres of flatland forest. The upland areas still support large amounts of forest interspersed with pastures which support cattle (*Bos sp.*).

Prehistorically this valley must have seemed like an upland heaven to the water-logged lowlanders. Here there were lithics from which cutting edges could be made and a great diversity of plants and animals seldom found in the swamps. The accessibility of these resources by lowlanders makes the Castor Gap a rare kind of environment. Archeological sites are of regional importance to understanding the prehistoric procurement systems, especially lithics, which were the basic cutting edge of their technology.

CHAPTER 3

PREVIOUS RESEARCH

by

Robert H. Lafferty III

INTRODUCTION

Archeological research has been carried out in Stoddard and adjacent counties for nearly a century. As with much of the Mississippi Valley, the earliest work was done by the Smithsonian Mound Exploration Project (Thomas 1894), which recorded the first site in Stoddard County - the Rich Woods site, 23SO1. Since that time a great deal of work has been done in the Bootheel region of the Central Mississippi Valley area (cf. Willey and Phillips 1958 for definitions of technical terms), resulting in several extensive syntheses of the region's prehistory (Morse and Morse 1983; Chapman 1975, 1980). In this chapter we summarize the archeological research which has taken place, what is known of the prehistory of the region, and the limits in these data as they apply to the Castor River Gap locality. Finally, we outline major research questions which directly relate to the data base recovered in this project.

The earliest professional archeological work in the region was the work carried out by the Smithsonian Institute mound exploration project (Table 2). Thomas (1894) and his associates excavated at three sites near the project area: Pecan Point, a Nodena phase site, Sherman mounds and the Jackson mounds. These Mississippi period sites were located outside the project area. Principally excavation in large mound sites, the work identified the American Indians as the authors of the great earthworks of the eastern United States.

Most of the early work was concerned with specimen collection for museums (e.g., Potter 1880; Moore 1910; Fowke 1910). Some data were used to define the great ceramic traditions, including the Mississippian tradition, in the eastern United States (Holmes 1903). Many of these original conceptualizations remain the basis upon which our current chronologies are structured (e.g. Ford and Willey 1941; Griffin 1952; Chapman 1952, 1980).

Table 2. Previous Archeological Investigations in Northeast Arkansas and Southeast Missouri.

Investigator	Location and Contribution
Potter 1880	Archeological investigations in southeast Missouri.
Evers 1880	Study of pottery of southeast Missouri.
Thomas 1894	Mound exploration in many of the large mound sites in southeast Missouri and northeast Arkansas.
Fowke 1910	Mound excavation in the Morehouse Lowlands.
Moore 1910, 1911 1916	Excavation of large sites along the Mississippi, St. Francis, White, and Black Rivers.
Adams and Walker 1942	Survey of New Madrid County.
Walker and Adams 1946	Excavation of houses and palisade at the Mathews site.
Phillips, Ford, and Griffin 1951; Phillips 1970	Mapping and sampling of selected sites in southeast Missouri, and northeast Arkansas, Lower Mississippi Valley Survey (LMVS), proposed ceramic chronology.
S. Williams 1954	Survey and excavation at several major sites in southeast Missouri, original definition of several Woodland and Mississippi phases.
Chapman and Anderson 1955	Excavation at the Campbell site, a large Late Mississippian Village in southeast Missouri.
Moselage 1962	Excavation at the Lawhorn site, a large Middle Mississippian Village in northeast Arkansas.
J. Williams 1964	Synthesis of fortified Indian villages in southeast Missouri.
Marshall 1965	Survey along I55 route, located and tested many sites north of the project area.
Morse 1968	Initial testing of Zebree and Buckeye Landing Sites.
J. Williams 1968	Salvage of sites in connection with land leveling, Little River Lowlands.
Redfield 1971	Dalton survey in Arkansas and Missouri Morehouse Lowlands.

Table 2 (continued). Previous Archeological Investigations.

Investigator	Location and Contribution
Schiffer & House 1975	Cache River survey.
Price et al. 1975	Little Black River survey.
Morse and Morse 1976	Preliminary report on Zebree excavations.
Chapman et al. 1977	Investigations at Lilbourn, Sikeston Ridge.
Harris 1977	Survey along Ditch 19, Dunklin County, Missouri.
Klinger and Mathis 1978	St. Francis II cultural resource survey in Craighead and Poinsett Counties, Arkansas.
LeeDecker 1978	Cultural resources survey, Wappapello to Crowley's Ridge.
Padgett 1978	Initial cultural resource survey of the Arkansas Power and Light Company transmission line from Keo to Dell, Arkansas.
I. R. I. 1978	Cultural resources survey and testing, Castor River enlargement project.
Dekin et al. 1978	Cultural resources overview and predictive model, St. Francis Basin.
LeeDecker 1979	Cultural resources survey, Ditch 29, Dunklin County, Missouri.
Morse 1979	Cultural resource survey inside Big Lake National Wildlife Refuge.
LeeDecker 1980a	Cultural resource survey, Ditch 81 control structure repairs.
LeeDecker 1980b	Cultural resources survey, Upper Buffalo Creek Ditch, Dunklin County, Missouri, and Mississippi County, Arkansas.
Morse and Morse 1980	Final report to COE on Zebree project.
J.Price 1980	Archeological investigations at 23DU244, limited activity Barnes site, Dunklin County, Missouri.

Table 2 (continued). Previous Archeological Investigations.

Investigator	Location and Contribution
Price and Price 1980	A predictive model of archeological site frequency, transmission line, Dunklin County, Missouri.
Lafferty 1981	Cultural resource survey of route changes in AP&L Keo-Dell transmission line.
Klinger 1982	Mitigation of Mangrum site.
Santeford 1982	Testing of 3CG713.
Bennett and Higginbotham 1983	Mitigation at 23DU227, Late Archaic through Mississippi period site.
Keller 1983	Cultural resources survey and literature review of Belle Fountain Ditch and tributaries.
Price and Price 1984	Testing Shell Lake Site, Lake Wappapello.
Chapman 1975, 1980	Synthesis of Archeology of Missouri.
Morse and Morse 1983	Synthesis of Central Mississippi Valley prehistory.
Lafferty et al. 1984, 1985	Cultural resource survey, testing and predictive model, Tyronza Watershed, Mississippi County, Arkansas.
Lafferty & Sierzchula 1986	Cultural Resources Survey and Record Check, Belle Fountain Ditch, Pemiscot and Dunklin Counties, Missouri.
Lafferty et al. 1987	Cultural resources survey and testing, pollen cores and geomorphic reconstruction, Ditch 29, Mississippi County, Arkansas.
Teltser 1988	Controlled surface collections on three sites, Stoddard and Dunklin Counties, Missouri.
Lafferty and Cande 1989	Cultural resources survey and testing Eaker Air Force Base Mississippi County, Arkansas.
Wadleigh and Thompson 1989	Proton Magnetometer survey, 3MS105, Eaker Air Force Base, Mississippi County, Arkansas.

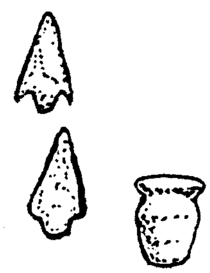
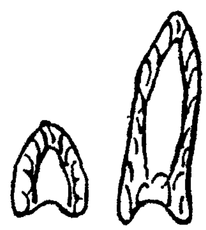
TIME SCALE	CULTURAL STAGES	CULTURES & PHASES	ASSOCIATED ARTIFACTS & TRAITS
1541	Historic	American European Historic Indian	Wide spread trade, machine produced artifacts, glass, glazed pottery, widespread use of metals, 
1000	Mississippian	Nodena Parkin Cherry Valley Lawhorn Big Lake	Palisaded villages with temple mounds, and satilite hamlets & farmsteads, arrow points, intensive farming, shell tempered pottery, wide spread riverine trade, food storage, stone hoes, rectanguloid celts. 
AD 0 BC 500	Woodland	Barnes Baytown Marksville Tchula	Beginning of agriculture, pottery making (sand and grog tempered), dart points, celts, 
8000	Archaic	Poverty Point Late Archaic Early Archaic Dalton	Seasonal use of different sites, hunting, fishing and foraging economy, dart points, grooved axes and a variety of stone tools (which persist in time), poverty point objects, adzes. 
10,000 +?	Paleo-Indian		Fluted points, Big game hunting. 

Figure 6. Time line of Central Mississippi Valley.

REGIONAL PREHISTORY

The studies described above and work in adjacent regions have resulted in the definition of the broad pattern of cultural history and prehistory in the region. However, knowledge of the region is still sketchy with few Archaic and Woodland period sites having been excavated. This status has seriously constrained our understanding of settlement systems. Therefore, while this region may be fairly well known with respect to the Mississippi period, much more work needs to be done before the basic contents and definitions of many archeological units in space and time are adequate (cf. Morse 1982a). Currently we have a few key diagnostic types associated with some cultural units, but the range of artifact assemblage variation across chronological and spatial boundaries is not yet defined. Nor are the ranges of site types known for any of the defined units. The adequate definition and resolution of these fundamental questions and problems are necessary before we can begin to reconstruct and use the data for understanding more abstract cultural processes, as is possible in better known archeological areas such as the American Southwest.

The Paleo-Indian period (10,000-8,500 B.C.) is known in the region from scattered projectile point finds over most of the area. These include nine Clovis and Clovis-like points from the Bootheel of Missouri (Chapman 1975:93). No intact sites have yet been identified from this period, and the basal deposits of the major bluff shelters thus far excavated in the nearby Ozark Mountains have contained Dalton period assemblages. Lanceolate points are known from bluff shelters and high terraces (Sabo et al. 1982:54), which may represent different kinds of activities or extractive sites, as they have been shown to have been in other parts of the country. For the present any Paleo-Indian site in the region is probably significant.

The Dalton period (8,500-7,500 B.C.) is fairly well known in the Lower Mississippi Valley, which has produced some of the better known Dalton components and sites in the central continent. These include the Sloan site (Morse 1973) and the Brand site (Goodyear 1974). These and other more limited or specialized excavations and analyses have resulted in the identification of a number of important Dalton tools (i.e., Dalton points with a number of resharpening stages, a distinctive adze, spokeshaves, several varieties of unifacial scrapers, stone abraders, bone awls and needles, mortars, grinding stones, and pestles). At least three different site types have been excavated: the bluff shelters, which were seasonal habitation sites, a butchering station (the Brand site), and a cemetery (the Sloan site). We do not have the other part(s) of the seasonal pattern which should be present in the region; nor have any other specialized activity sites been excavated. Dalton sites are known in a number of locations, especially on the edge of the relict braided surface, on Crowley's Ridge and the edge of the Ozark Escarpment. Given the present resource base, a number of important questions have been posed concerning the early widespread adaptation to this environment (Price and Krakker 1975; Morse 1982a, 1976). Adjacent areas of the Ozarks have had modern controlled excavations from Rogers, Albertson, Tom's Brook, and Breckenridge shelters (McMillan 1971; Kay 1980; Dickson 1982; Logan 1952; Bartlett 1963, 1964; Wood 1963; Thomas 1969).

The Early to Middle Archaic periods (7,500 - 3,000 B.C.) are best known from bluff shelter excavations in the Ozarks (Rogers, Jakie's, Calf Creek, Albertson, Breckenridge and Tom's Brook shelters). During this long period a large number of different projectile point types were produced (i.e., Rice Lobed, Big Sandy, Graham Cave, Kirk Corner Notched, White River Archaic, Hidden Valley Stemmed, Hardin Barbed, Searcy, Rice Lanceolate, Jakie Stemmed, and Johnson). Five Early Archaic points were recovered at 23SO496. No controlled excavations have been done at any Early or Middle Archaic site in southeast Missouri or northeast Arkansas (Chapman 1975:152). There are no radiocarbon dates for any of the Archaic period from southeast Missouri (Dekin et al. 1978:78-79; Chapman 1980:234-238). The Middle Archaic archeological components are rare to absent in the Central Mississippi Valley, leading the Morses to propose that the region was abandoned during this dry period (Morse and Morse 1983). Therefore, much of what we know of the archeological manifestations of this period is based upon work in other regions that has been extrapolated to the Mississippi Valley. At present, phases have not been defined.

The Late Archaic period (3,000 B.C. - ~500 B.C.) appears to be a continuing adaptation to the wetter conditions following the dry Hypsithermal. This corresponds to the sub-Boreal climatic episode (Sabo et al. 1982). The lithic technologies appear to run without interruption through these periods, with ceramics added at about the beginning of the present era. Major excavations of these components have taken place at Poverty Point and Jaketown in Louisiana and Mississippi (Ford, Phillips and Haag 1955; Webb 1968). A fairly large number of Late Archaic sites are known in eastern Arkansas and Missouri (Chapman 1975:177-179,224; Morse and Morse 1983:114-135). Major point types include Big Creek, Delhi, Pandale, Gary and Uvalde points. Other tools include triangular bifaces, manos, grinding basins, grooved axes, atlatl parts and a variety of tools carried over from the earlier periods such as scrapers, perforators, drills, knives, and spokeshaves. Excavations at the Phillips Spring site have documented the presence of tropical cultigens (squash and gourd) by ~2,200 B.C. (Kay et al. 1980). The assemblages recovered in the bluff shelters from this time period indicate there was a change in the use from general occupation to specialized hunting/butchering stations (Sabo et al. 1982:63). There are some indications of increasing sedentariness in this period; however, the range of site types have not been defined. Late Archaic artifacts are well known from the region, with artifacts usually present on any large multicomponent site. Our understanding of this period is limited to excavations from a few sites (Morse and Morse 1983; Lafferty 1981). At present we do not know the spatial limits of any phases, which have not been defined, nor do we have any control over variation in site types and assemblages.

The Early Woodland period (500 B.C.(?) - 150 B.C.) saw the lithic traditions from the previous period continue and pottery begun. As with the Archaic period, this is a little understood archeological period with no radiocarbon dates for the early portions of the sequence. The beginning of the period is not firmly established, and its termination is based on the appearance of Middle Woodland ceramics dated at the Burkett site (Williams 1974:21). The original definition of the Tchula period was made by Phillips, Ford, and Griffin (1951:431-436). In the intervening time a fair amount of work has been done on Woodland sites. Chapman concludes that we are not yet able to separate the Early Woodland assemblages from the components preceding and following. At present there is considerable question if there is an Early Woodland period in southeast Missouri (Chapman 1980:16-18). Recent work in northeast Arkansas, however, has identified ceramics which appear stylistically to be from this time period (Morse and Morse 1983; Lafferty et al. 1985 a). J. Price (personal communication) has identified a similar series of artifacts in the southeast Missouri Bootheel. Artifacts include biconical Poverty Point objects, cordmarked pottery with noded rims similar to Crab Orchard pottery in southern Illinois and the Alexander series pottery in the Lower Tennessee Valley, and Hickory Ridge points. MCRA has recently tested several sites (3MS21, 3MS119, 3MS199 and 3MS471) near the current survey area that contain Early Woodland components.

Middle and Late Woodland periods (150 B.C.- A.D. 850) were a time of change. Participation in the "Hopewell Interaction Sphere" (dentate and zone-stamped pottery, exotic shell; Ford 1963) and an increase in horticulture (corn, hoe chips, and farmsteads) become evident. Mound construction, notably the Helena mounds at the south end of Crowley's Ridge (Ford 1963) indicates greater social complexity. Typical artifacts include Snyder, Steuben, Dickson, and Waubesa projectile points and an increasing number of pottery types (cf. Rolingson 1984; Phillips 1970; Morse and Morse 1983). In the Late Woodland period there is an apparent population explosion as evidenced by a great number of sites with plain grog-tempered pottery in the east and Barnes sand-tempered pottery in the west of the Central Valley (Morse and Morse 1983: 180; Chapman 1980). In this period there is some evidence of architecture (cf. Morse and Morse 1983; Spears 1978) as well as mound center construction (Rolingson 1984). A number of large open sites have not been excavated, so the spectacular mound centers appear to shape what we know about this important period. A great deal is not understood about the cultural sequence and changes that occurred then. The Late Woodland period in this area has been suggested as the underlying precursor to the Mississippi period, which came crashing into the area with the introduction (invention ?: cf. Price and Price 1981) of shell-tempered pottery and the bow and arrow around A.D. 850.

The Mississippi period (A.D. 850-1673) is known from the earliest investigations in the region (Thomas 1894; Holmes 1903; Moore 1916). It has been the most intensively investigated portion of the prehistoric record in northeast Arkansas and southeast Missouri (Chapman 1980; Morse and Morse 1983; Morse 1982 b; Morse 1981; House 1982). Enough work has been done to define the spatial limits of phases (cf. Chapman 1980; Morse and Morse 1983; Morse 1981). During this period the native societies reached their height of development with fortified towns, organized warfare, more highly developed social organization, corn, bean, and squash agriculture, and extensive trade networks. The bow and arrow was common and there was a highly developed ceramic technology (cf. Lafferty 1977; Morse and Morse 1980; Smith 1978). This effervescence was abruptly terminated by the De Soto entrada in the mid-16th century (Hudson 1984, 1985; Morse and Morse 1983) which probably passed through the project area.

PROTOHISTORIC PERIOD

The De Soto entrada resulted in the first recorded descriptions of Mississippi County, Arkansas, and the Mississippian Climax (Varner and Varner 1951; Hernandez de Biedma 1851; Elvas 1851;). The interpretation of places herein follows those of Morse (1981) and Hudson (1985). In the summer of 1541 De Soto was allied with the Casquians in a military expedition against the province of Pacaha. According to Morse:

> The large swamp up the Tyronza [between Tyronza Junction and Victoria in the southwest corner of the county] is a suitable candidate for the boundary between Casqui and Pacaha. Pecan Point, a Nodena phase village near the Mississippi River [southeast of Wilson], could probably be the location of the capital of Pacaha. It was an impressive site producing numerous fine pottery specimens, and is located an appropriate distance from Parkin. An expedition left Pacaha for an area '40 leagues distance' to get salt and yellow metal (Varner and Varner 1951:449). The only area where both salt and copper occur together in large amounts is in southeast Missouri, within easy reach of the Nodena phase [which occupied most of Mississippi County east of Big Lake]. Mountains also occur here as observed by the Spanish (Morse 1981:68).

There is some evidence that this exploratory expedition traveled north from Pacaha through the Missouri Bootheel. The Campbell site, a large Nodena site located 1 km east of the project area is reported to have produced 16th century European artifacts. An expedition of 25 Spaniards traveled north and back in about a month and reported that the lands of the bootheel were scraggly blasted old fields with few people.

Historic Period (1673-present). Following the De Soto expedition the area was not visited until the French opened the Mississippi Valley in the last quarter of the 17th century. The Indian societies were a mere skeleton of their former glory and the population a fraction of that described in the De Soto chronicles. Marquette, in his rediscovery of the Mississippi for the French, did not encounter any Indians between the Ohio and the Arkansas Rivers. He described this section of his journey south of the Ohio River as follows:

> Here we Began to see Canes, or large reeds, which grow on the banks of the river; their color is a very pleasing green; all the nodes are marked by a Crown of Long, narrow, pointed leaves. They are very high, and grow so thickly that The wild cattle have some difficulty in forcing their way through them.
>
> Hitherto, we had not suffered any inconvenience from the mosquitoes; but we were entering their home, as it were...
>
> We thus push forward, and no longer see so many prairies, because both shores of The river are bordered with lofty trees. The cottonwood, elm, and basswood trees there are admirable for Their height and thickness. The great numbers of wild cattle, which we heard bellowing, lead us to believe that The Prairies are near. We also saw Quail on the water's edge. We killed a little parroquet, one half of whose head was red, The other half and The Neck was yellow, and The whole body green (Marquette 1954:360-361; strange capitalization in the French original).

During the French occupation most of the settlements were restricted to the major river courses with trappers and hunters living isolated lives in the headwaters of the many smaller creeks and rivers. The St. Francis River was one of the earliest explored tributaries of the Mississippi River in the Lower Mississippi Valley and appears on some of the earliest French maps.

EARLY AMERICAN SETTLEMENT

In 1803, the French sold the Louisiana Territory, which included today's Missouri, to the United States. The territory was administered from the territorial capital in St. Louis.

The Euro-American occupation proceeded overland down Crowley's Ridge, spreading out from the rivers. In 1835, ports were established at Piggott, on the high ground of Crowley's Ridge in the St. Francis Gap. Piggott was located on the Helena-Wittsburg road which ran down Crowley's Ridge (Dekin et al. 1978:358) and crossed the Castor River 3.3 miles downstream from 23SO496. This is across the narrowest part of the flood plain and the only place where there are well drained soils all the way across the flood plain. All settlements in the 1830s, between Piggott and Helena in the St. Francis Basin, were either along rivers or on Crowley's Ridge. Bloomfield, on Crowley's Ridge, was founded in 1824, while Malden, on the plain, was founded in 1877. Towns continued to be established in these environments into the early 1900s. Settlements away from the rivers and along overland roads began in the 1850s. They greatly accelerated with the construction of the railroads, levees and drainage ditches in the late 19th century.

The passage of the stern-wheel steamboat, "Orleans", from Pittsburgh to New Orleans in 1812 presaged great changes for the Louisiana Territory. This boat and the many others to follow used wood to power their steam engines and thus created a demand for cordwood. The early settlers, who tended to live in cabins in clearings along the river, met this need by chopping and selling wood to the boats (Edrington 1962: 49). Perhaps more importantly, the steamboat made two-way transportation on the great river roads in the nation's heart much faster and more reliable - when the rivers were up.

SUMMARY

23SO496 is located on a levee of the recent Castor River. The levee is on top of old swamp/lake/relict braided surface deposits which probably had been seasonal swamps. The levee on which the site is situated, three meters above the current course of the river, was fairly safe from flooding most of the time. Directly across from the western end of the site are the bluffs of Crowley's Ridge with elevations towering 60 feet above the valley floor. These bluffs presumably were the source of the gravel bar located at the site's east end and one of the major factors in the occupation of this site throughout the Stone Age. This is one of seven locations in the Castor River Gap where the river actively cuts Crowley's Ridge. Upstream are three other locations and downstream are two. Downstream from 23SO496 the Castor River meanders for 3.5 miles until abutting the ridge at Aquilla. The site testing revealed deposits up to .70 m thick with Early Archaic through Mississippian occupation.

The next chapter opens with a review of the results of the site testing to provide the reader a context for an explanation of the methods used to mitigate the project impacts.

CHAPTER 4

23SO496, DESCRIPTION AND PREVIOUS KNOWLEDGE

by
Robert H. Lafferty III

DISCOVERY AND PRELIMINARY ASSESSMENT

23SO496 is a large, multicomponent prehistoric site initially recorded and tested by Iroquois Research Institute (IRI) in 1978. Institute investigations consisted of controlled surface collections in two areas of the site, several shovel tests, and excavation of one 1 m x 1 m test unit. Although surface visibility at the site was poor because of tall winter wheat, IRI collected a high density of artifacts in three 10 m x 10 m units on the site's eastern end. The test unit, adjacent to one high density area, contained artifacts in the top 8 cm or plowzone level (IRI 1978:134). All shovel tests on the site were negative. Collected diagnostic artifacts included projectile points from the Woodland and Archaic periods. Based on the collected information, the site was considered to have been utilized as a temporary campsite or as an extraction area for local resources throughout several periods (IRI 1978:134).

NRHP TESTING

When MCRA conducted its NRHP testing of the site in 1985, surface visibility was excellent because of short, sparse grass, weeds and wild onions. The site, which extended over 150,000 square meters, contained a high density of artifacts and a midden stain. Test excavations also showed an area of intact midden, features, and cultural levels. Further examinations included controlled surface collections, shovel tests, mapping of diagnostic artifacts, and excavation of six 1 m x 1 m units. Based on the collection of over 40 lithic tools and/or projectile points and 10 sand- or grog-tempered ceramics, the site dates from the Archaic through the Woodland periods. Because it contains important intact deposits, 23SO496 has a high research potential and is considered eligible to the National Register of Historic Places.

Methods of Testing

A total of 3.5 days was spent testing 23SO496. MCRA's initial visit to the site disclosed an area of dark midden stain on the surface. The southeast edge of the terrace had been severely eroded recently, exposing an extremely high density of artifacts. This area was literally paved in lithics (Figure 7). A CSC unit measuring 2.5 m x 2.5 m (6.25 square meters) was positioned within the concentration. Then the entire plowzone level was quickly skimmed off to observe whether intact levels or features remained. Feature 1, a large pit, was exposed in this manner, and a 1 m x 1 m unit (Test Unit 2) was excavated in order to examine a portion of this feature.

The surface of the entire length of the terrace and flood plain below was closely examined. Four people, spaced 10-15 m apart, walked in zigzag fashion up and down the terrace. All diagnostic tools were flagged, mapped, and collected. Artifacts were observed the entire length of the terrace with high density areas on rises or knolls next to the terrace edge. Test Unit 3 was positioned within a concentration half the distance between the southeast and northwest ends of the terrace. Test Unit 6 was placed at the site's northwest end on the edge of the river bank, and Test Unit 5 was located on a high spot west of Test Unit 6 and a drainage area.

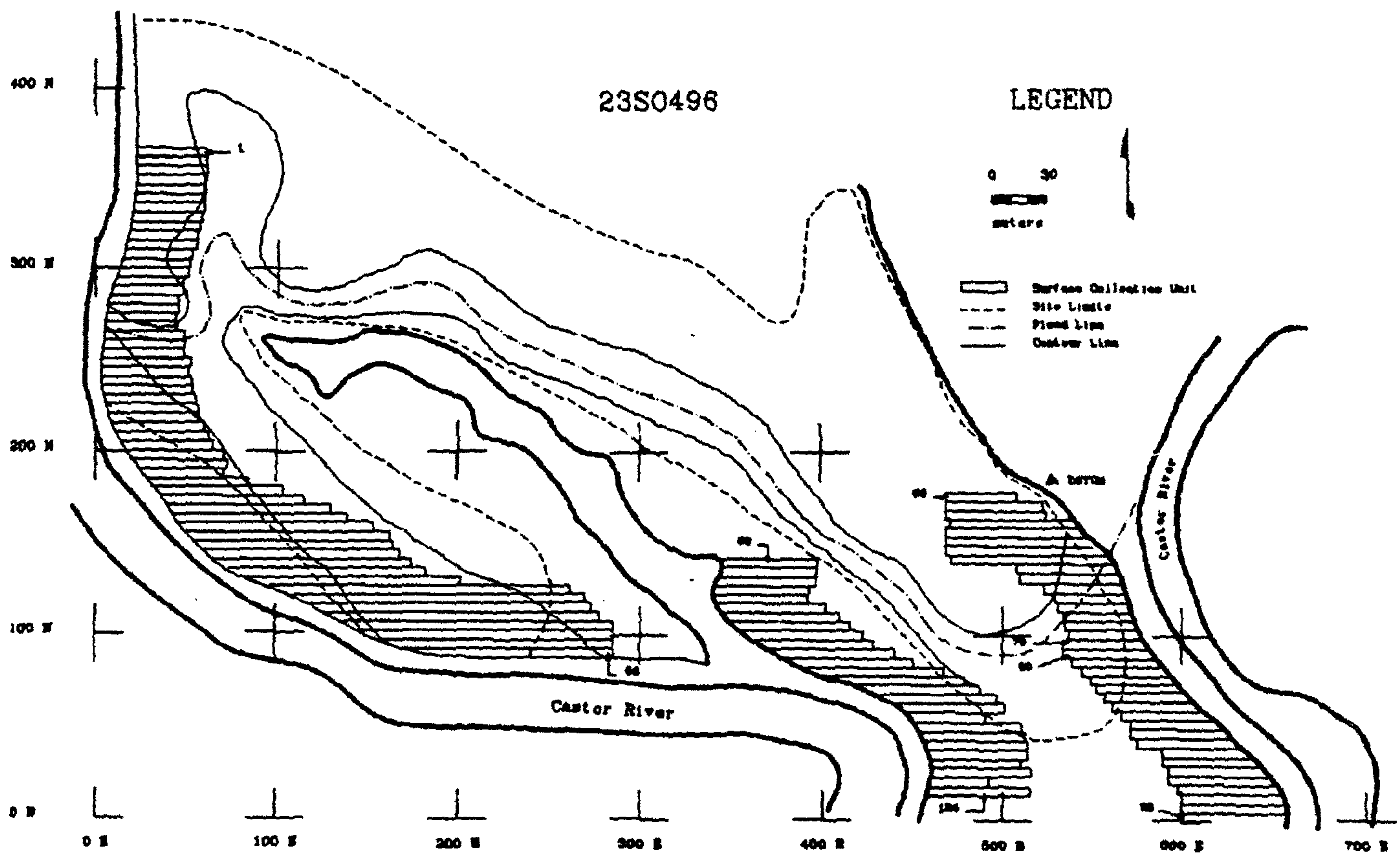


Figure 7. 23SO496. Site map.

The flood plain was examined in a similar fashion as the terrace. After a hard rain, additional artifacts and the base of a sand-tempered pot were found in the flood plain at the site's southeastern end. Beyond the areas labeled B, C, and D in Figure 8, there was low drainage and only a few noticeable artifacts. A few widely scattered artifacts were observed below the northwest end of the terrace along the top of a low northwest to southeast rise. Shovel Test 4 and Test Unit 4 were positioned on this rise (Figure 7). Since cultural material and features were found in this area of the flood plain, the site boundaries were greatly expanded, from the 89,400 square meters (IRI 1978:133) to 150,000 square meters.

Controlled Surface Collections

As stated, a controlled surface collection (2.5 m x 2.5 m) was made on the southeast end of the site where rain had scoured out portions of 23SO496. Over half an hour was spent by four people collecting all artifacts in this unit. The artifacts, which completely filled three large cloth bags, included a total of 407 lithic artifacts, one grog-tempered sherd, and 2.9935 grams of fire-cracked rock (Table 3).

Surface artifact density in this area of the site is 65 artifacts per square meter, not including the fire-cracked rock. By weight and including the fire-cracked rock, there were 757 grams per square meter. The high density of material by count is considerably more than the .5 mean surface density which Iroquois Research Institute (1978:133) computed based on their controlled collections in 1978.

The assemblage, which includes a high frequency of decortication flakes, three hammerstones, and lots of lithic debris is an indication that reduction and manufacturing activities were conducted here. The ratio of debitage and tool manufacturing debris to whole or fragmentary tools and projectile points is almost 40 to 1 and is another indication of tool manufacturing activities.

Mapped Artifacts

In addition to debitage, 61 projectile points or tools and one sand-tempered pot base (reconstructable from six base and 11 body sherds) were observed on the surface of the site and mapped according to provenience. These plotted specimens are shown in Figures 7, 8, and 9. Lithics in this sample included 41 projectile points or fragments, three preforms, two drills, seven bifaces, one hafted digging tool or ax, one Mill Creek hoe fragment, three large primary flakes, one true blade, one fire-cracked rock, and one side notched tool (Table 4).

The mapped specimens included 31 projectile points which, based on morphology can be assigned to a temporal period. Of these, three were Early Archaic side notched types, Graham Cave and Big Sandy (one Graham Cave point did not exhibit basal grinding); one was a Middle Archaic point similar to the Rice Lobed; two were Late Archaic Rice Sidenotched; five were Early Woodland corner notched points; two were Middle Woodland, Steubens; two were Late Woodland, Steuben Expanding Stemmed; eight were from the Late Archaic to the Middle Woodland period, Stone Square Stemmed; three were Late Archaic to Woodland, two unidentified and one Gary; and two were Woodland types. Based on this sample, the site is affiliated from the Early Archaic to the Late Woodland periods with the majority of the typable projectile points from the Late Archaic to the Middle Woodland periods.

The base of the sand-tempered pot was found in the mud on the floodplain after a gully-washing rainstorm. It has characteristics of the Barnes type and is an indication of the Woodland occupation.

The mapped specimens delineated several concentrations of artifacts along the terrace. Each of these could be interpreted as a separate site or location of prehistoric activity. In addition, several discrete clusters of artifacts from the same time period were observed. This is one indication that there are temporally distinct units and activity areas on the site. Controlled collections of small units in large blocks over the site would add significant information on these already observed temporal and activity areas.

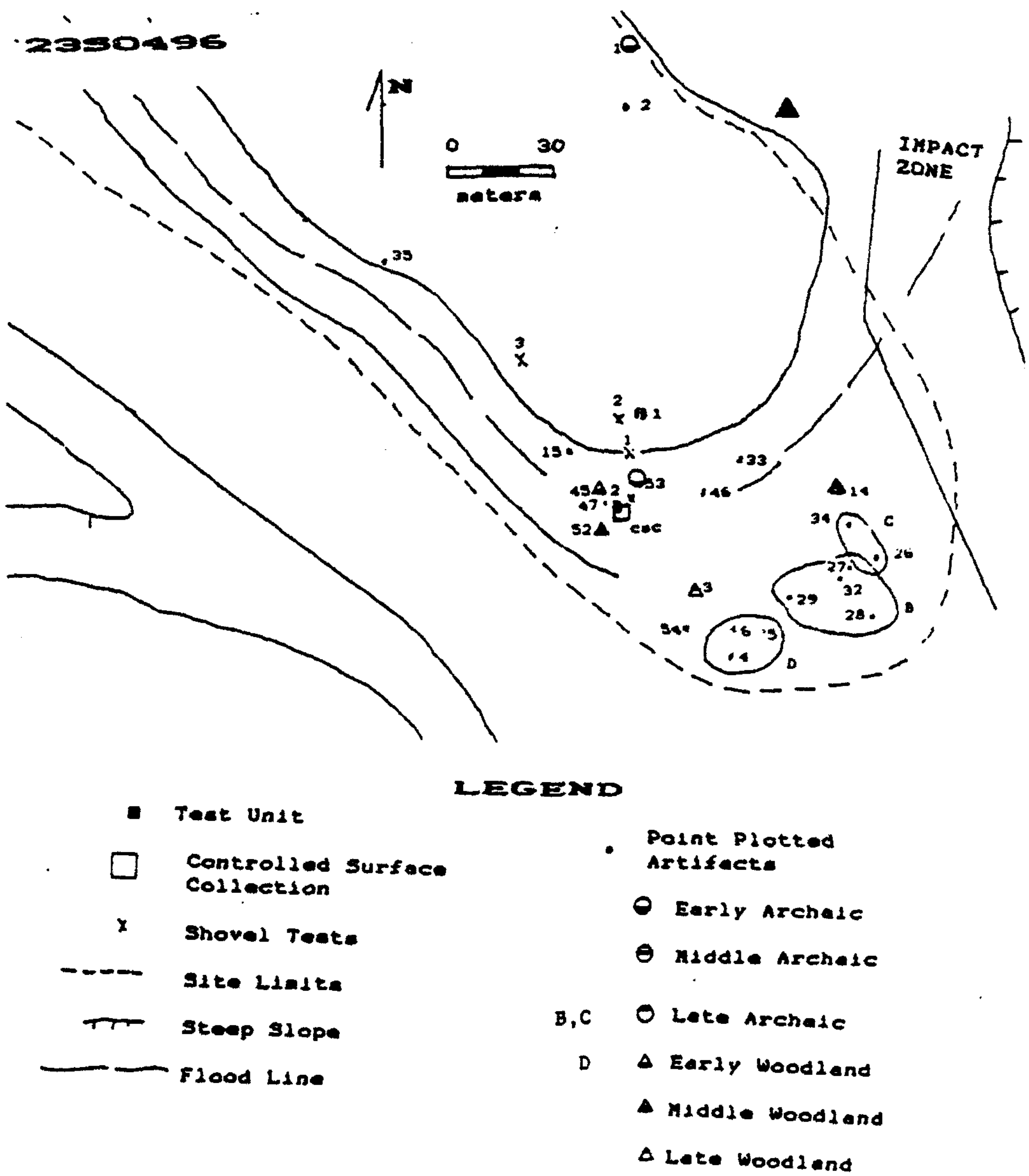


Figure 8. 23SO496. Detailed map of the east end of site.

Table 3. Site 23SO496. Controlled Surface Collection Material.

Artifact	Count	WT (gms)
Fire-Cracked Rock	NA	2993.5
Grog Plain Body Sherd	1	2.9
Hammerstones	3	261.8
Decortication Flakes	212	1023.9
Debitage	181	384.3
Glass (clear)	1	2.8
Scraper	1	10.7
Biface Fragments	2	27.1
Drill Fragment	1	1.8
Unidentified PP/K Fragments	5	19.6
Ensor (?) PP/K	14.6	
Totals	408	4733

Table 4. 23SO496. Point-Plotted Surface Material.

FSN	Artifact	Count	WT (gms)
1	Big Sandy PP/K (EA)	1	13.0
2	Mill Creek Hoe Fragment	1	51.0
3	Steuben Expanded Stem PP/K (MW-LW)	1	3.0
4	Kirk Corner Notched PP/K (EA)	1	7.5
5	Delhi PP/K (LA)	1	9.5
6	Delhi PP/K (LA)	1	14.0
7	Big Sandy (EA)	1	13.0
8	Steuben Expanded Stem PP/K (MW)	1	6.5
9	Chipped-stone Axe	1	54.0
11	Preform	1	19.5
12	Stone Square Stem PP/K (MA-LA)	1	22.5
13	Rice Side Notched PP/K (W)	1	6.5
14	Steuben Expanded Stem PP/K (MW-LW)	1	6.0
15	Preform	1	39.5
20	Biface	1	52.0
21A	Unidentified PP/K Fragment	1	7.0
21B	Unidentified PP/K Fragment	1	4.3
22	Biface	1	12.0
23	Unidentified PP/K Fragment retouched into steep edge scraper	1	7.0
24	Flake	1	5.0
25	Stone Square Stem PP/K (MA-LA)	1	23.5
26	Fire Cracked Rock	1	41.0
27	Stone Square Stem PP/K (MA-LA)	1	10.5

Table 4 (continued). 23SO496. Point-Plotted Surface Material.

FSN	Artifact	Count	WT (gms)
28	Biface Fragment	1	11.0
29	Stone Square Stem PP/K (MA-LA)	1	13.5
30	Stone Square Stem PP/K (MA-LA)	1	15.5
31	Biface	1	35.5
32A	Sand, Base Sherds	6	134.5
32B	Sand, Body Sherds	11	52.8
33	Unidentified PP/K Fragment	1	8.0
34A	Gary PP/K	1	14.5
34B	Unidentified PP/K Fragment	1	6.0
34C	32 caliber Lead Ball (1800s)	1	5.0
35A	Quartzite Flake	1	79.5
35B	Unidentified PP/K Fragment	1	8.6
35C	Unidentified PP/K	1	31.7
38	Unidentified PP/K Fragment	1	4.5
40	Stone Square Stem PP/K (MA-LA)	1	23.6
41	Rice Side Notched PP/K (ca. MW)	1	10.0
42A	Biface Fragment	1	28.0
42B	Quartzite Flake	1	10.0
43	Drill Base	1	6.2
44	Steuben Expanded Stem PP/K (ca. MW)	1	6.0
45A	Biface	1	18.5
45B	Unidentified PP/K	1	11.6
46	Rice Lobed PP/K (EA)	1	5.7
47	Unidentified PP/K Fragment	1	2.8
48	Stone Square Stem PP/K (MA-LA)	1	22.8
50	Unidentified PP/K Fragment	1	5.0
51	Biface	1	18.0
52	Stone Square Stem PP/K (MA-LA)	1	13.2
53	Graham Cave Side Notched PP/K (EA)	1	5.2
54	Preform	1	6.5
55	Unidentified Corner Notched PP/K (EW?)	1	14.0
56	PP/K Fragment retouched into steep edge scraper	1	5.3
59	Unidentified Corner Notched PP/K (W?)	1	5.0
83A	Unidentified PP/K Fragment	1	9.5
83B	Drill Base	1	9.5
84	Unidentified PP/K	1	5.0
85	Unidentified PP/K Fragment	1	7.5
88A	Side Notched Tool	1	13.5
88B	Flake	1	4.6
Totals		77	1,115.4

Legend: EA - Early Archaic; MA - Middle Archaic; LA - Late Archaic; EW - Early Woodland; MW - Middle Woodland; LW - Late Woodland; PP/K - Projectile point/knife.

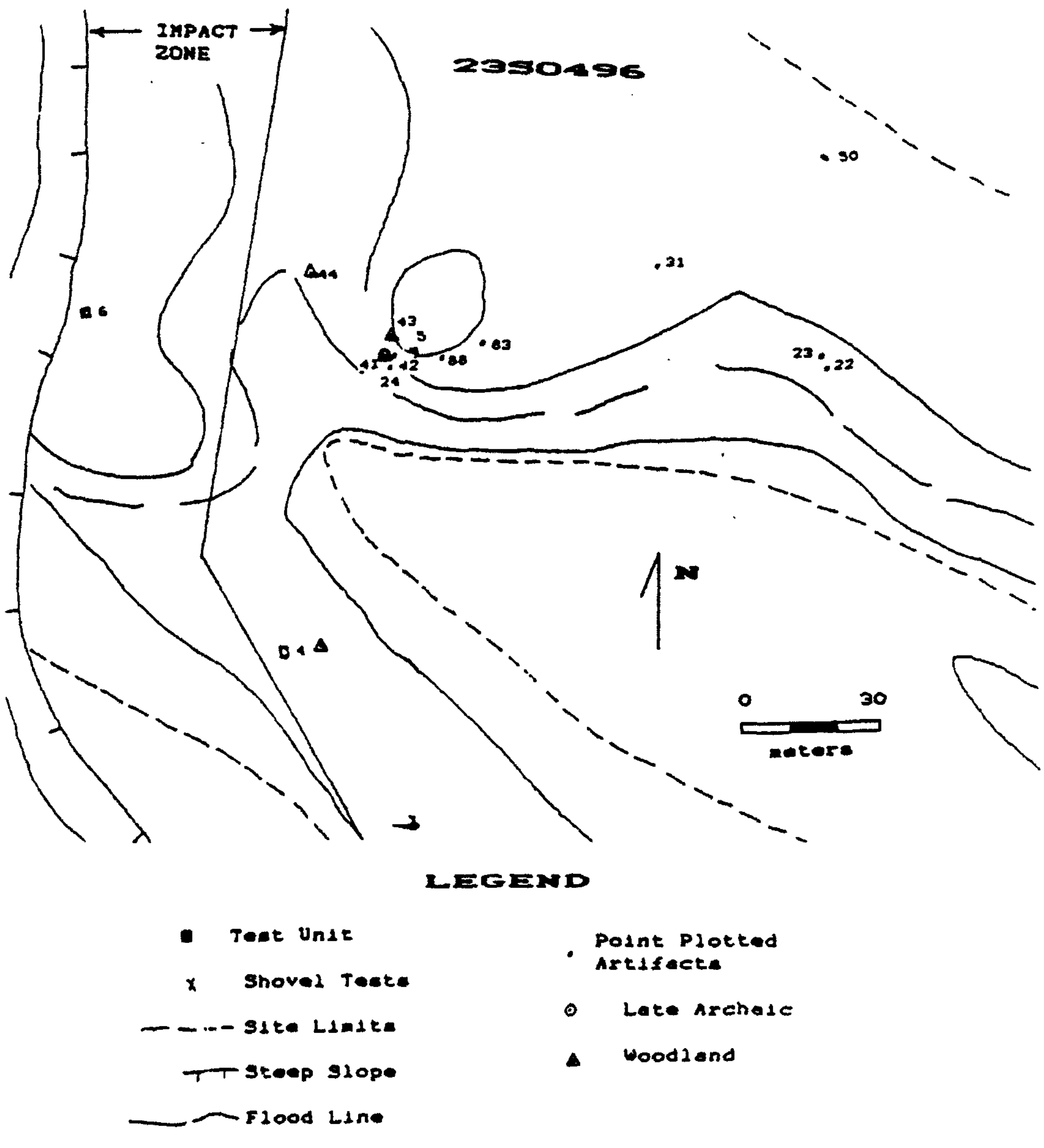


Figure 9. 23SO496. Detailed map of west end of site.

By plotting these artifacts according to cultural period, several tight clusters of artifacts from the same time period are evident (Figures 7, 8 and 9, Groups A-E). These include the three Stone Square Stemmed points located within a 20 m area in the approximate center of the site (Group A) and a similar grouping with a sand-tempered pot base in the flood plain on the southeast edge of the site (Group B). Two Rice side notched points (Group C) form a tight cluster near Group B. Only 25 m southwest of that group were three Early Archaic side notched projectile points (Group D). In the northwest part of the site, near Test Unit 5, one Late Archaic, one Early Woodland corner notched and two drill fragments were found within a 25 square meter area. Only one other drill was found in the controlled collection area at the site.

Test Units

A total of six 1 m x 1 m test units were excavated at the site (Figure 7). Test Units 1 and 2, placed at the east end of the site, documented six features and intact midden below the plowzone. Test Unit 3, between the southeast and northwest concentrations, had gleyed clay at the base of the plowzone. Its profile was similar to the results reported by IRI. Test Unit 4 was placed in the southwest part of the site at an elevation lower than the main axis of the site. This unit documented the presence of a feature and intact midden between 20-30 centimeters below the surface. Test Units 5 and 6, excavated in the northwest part of the site, documented thin subplowzone intact deposits.

Site Function and Cultural Affiliation

Site 23SO496 is a multicomponent site occupied from the Early Archaic to the Late Woodland periods. During this period the site functioned as a lithic manufacturing area, as a campsite, and as a semipermanent or permanent village during the later periods.

Site Significance, Impact, and Recommendation

Due to the presence of areas with both intact levels and features, the site has a high research value and is eligible for nomination to the National Register of Historic Places. The proposed Castor River project likely would damage this site by tracking equipment across its edges as the river is cleared and contoured. To mitigate this damage, MCRA recommended that a controlled surface collection be made in the impact zone and that equipment be allowed on the site only when it was tractable.

CHAPTER 5

DATA RECOVERY BY CONTROLLED SURFACE COLLECTION

by

Michael C. Sierzchula

ARCHEOLOGICAL FIELD METHODS

Introduction

As noted in Chapter 1, the investigations conducted at 23SO496 concerned the recovery of information present on the surface. Earlier testing of this site documented the existence of temporally sensitive areas on the surface as well as stratified cultural deposits (Lafferty et al. 1985). Due to the nature of the work to be performed by the U.S. Army Corps of Engineers, only the cultural material present on the surface will be impacted (Chapter 4). Therefore controlled surface collections were conducted on that portion of the site located within the project right of way (ROW). The discussion below details how the grid system was established, problems encountered establishing the grid system, and the records system.

Controlled Surface Collections

The use of CSC units as a mitigation measure at 23SO496 is unique since the units are to be used to indicate where to initiate subsurface investigations. The use of CSC units during the investigation of an archeological site was first initiated at the Hatchery West site in 1963 in an attempt "... to investigate the nature of the relationship between the structure of the site as defined by the surface distribution of cultural items and the structure of the site as defined by the spatial configuration of subsurface cultural features" (Binford et al. 1970:7). While the use of this technique at Hatchery West determined that densities of artifacts by themselves did not correlate with distribution of features or the functional variability represented (Binford 1970:71), CSC units have been successfully used by others to identify temporally sensitive areas and to guide subsurface investigations during the initial stages of mitigation at an archeological site (Lafferty et al. 1986; Lafferty et al. 1988a; Hemmings et al. 1985; Waddell et al., 1987).

Within the context of the present investigation, CSC units were used to isolate functionally and/or temporally sensitive areas on the portion of the site within the project ROW (Chapter 4). This area represented the fringes of the site: the densest and most diverse concentration of cultural material were on the most elevated areas outside the project ROW (Figure 7, Chapter 4).

Grid System

At the time of the data recovery project, soybeans and corn were growing in the field on the site (Figure 10). The crop rows were essentially oriented east-west with a one- to two-degree difference between the corn and soybeans. The corn was oriented 89/271 to 90/270 degrees. The soybeans were 91/269 degrees. In bloom, the soybeans stood .65 m tall and had grown together at the top in most areas, obscuring the ground surface. The corn was approximately 2.40 m tall over most of the land occupied by this crop (Figure 11). A restricted area in the southeast portion of the site had corn from 1.5 m to 2.1 m tall. Little to no undergrowth was present in the areas occupied by the corn. The presence of these crops essentially dictated the manner in which the grid system was established and oriented.

The initial step in establishing the grid system was the correlation of several points on the ground relatable to the aerial photographs and maps of the project area. The ROW width (125 feet) was then measured from each point, and the interior perimeter was established. Next the ROW boundary between each point was established by drawing a line between adjacent points on the aerial photographs. This procedure allowed MCRA to determine the length of each of the collection rows. Collection row lengths were measured from the maps on which their relative lengths were noted. This was necessary because the length of the columns would gradually change due to the meandering nature of the river and the adjacent woodline, in contrast with the consistent direction (east-west) of the row crops that dictated the grid orientation (Table 5).

The length of each CSC unit was established at 5 m. The width of each CSC unit was based on the row spacing of the soybeans and corn. Row spacing for both of these crops was 70 cm. As a result, each CSC unit was 5 m in length by 4.9 m or seven crop rows.

Each column was sequentially designated with a number, starting with 1. Each CSC unit within a column was sequentially designated with a letter, beginning with *a*. In instances where more CSC units existed than letters were doubled (e.g. aa).

The grid system was established using a 100 m tape. Each column was measured from the edge of the woodline (project ROW edge) adjacent to the Castor River to that point determined to be the other edge of the project ROW based on the distance computed from the aerial photographs. Five meter increments were measured and established with flagging tape. Upon completion, MCRA personnel took up the tape, moved over seven rows, and repeated the process until the entire site area within the project ROW had been gridded. Working around the crops was quite time consuming. After the grid system was mapped, four datum points were established in areas that would not be disturbed by agricultural practices.

Artifact Collection

One individual was assigned to a column and instructed to collect and separately bag all cultural material from each CSC unit, including fire-cracked rock. All material from a single CSC unit was identified by the grid coordinates (e.g. 1A, 1B) and assigned a Field Specimen Number (FSN). This number and the grid coordinates were recorded in the 23SO496 log.

CONSTRAINTS

Constraints encountered over the course of this project included the maturity of the crops in the field, problems associated with having to work around them, and the weather.

The extreme heat, associated with the national drought in the summer of 1988, combined with brief but torrential downpours made field work difficult. Daily temperatures surpassed 100 degrees Fahrenheit, and relative humidity was high. The heat factor was amplified by having to work amid tall plants that effectively restricted all air circulation. Extreme caution was taken to assure that adequate water and electrolytes were furnished to crew members.

The brief but intense downpours left low-lying areas of the site under water for extended periods of time. In one instance, field work ceased until these areas had drained.

Despite drought conditions, the soybeans and corn measured as high as .65 m and 2.38 m, respectively, because the farmer was irrigating them. The tall crops increased the time required to perform all phases of this investigation. For example, as each column was established MCRA, personnel would have to backtrack down the row to find the adjacent column Nor would the tall crops permit the use of a transit to establish a base line for gridding each portion of the site. Instead, all columns were established based on the location of the woods line which followed the course of the Castor River.

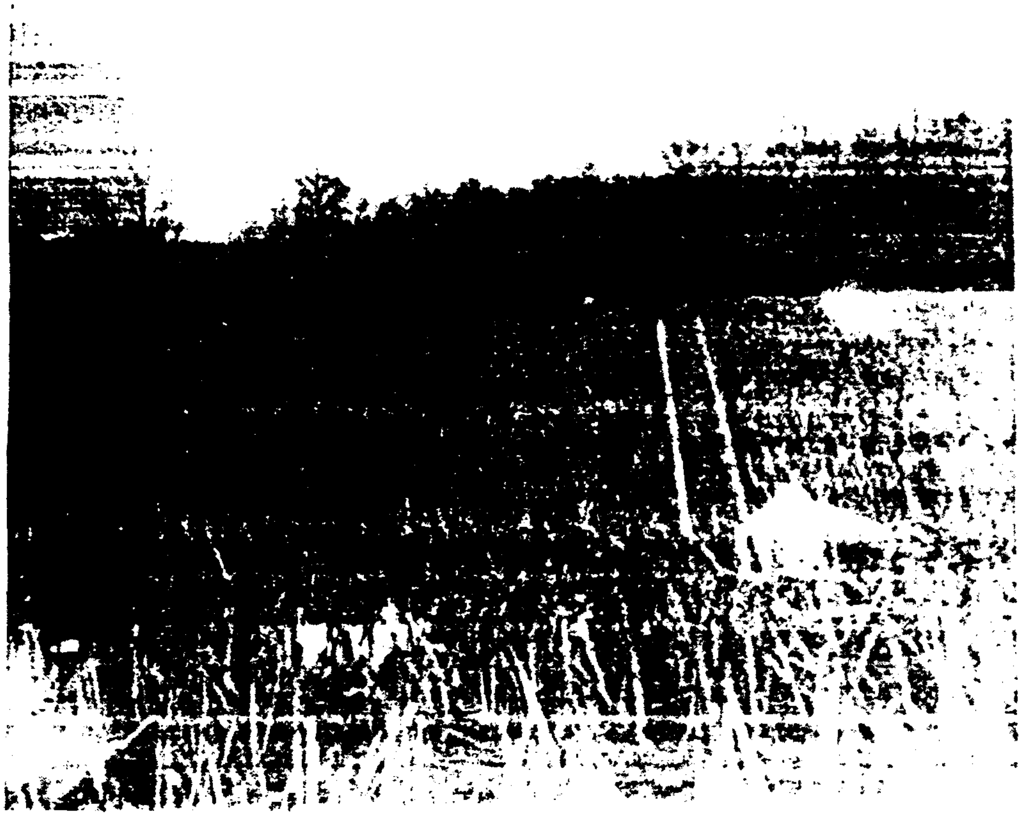


Figure 10. Photograph of the site area.

Figure 11. Photograph of corn.

The presence of these crops determined the orientation of the grid system. All columns followed the direction of the rows (east-west) because this was the only way to establish grid control without destroying large part of the crops. This situation did not allow MCRA to establish a grid system oriented with the topographic features on this site.

CONVERSION TO GRID COORDINATES

To manipulate the controlled surface collection, row/column designations were converted to Cartesian coordinates. The grid control on 23SO496 was based on row numbers which were in seven-crop-row increments from north to south. These were numbered consecutively in three blocks: West, East and Central. Northing was correlated among the three blocks by lining up key points between each block, which were later plotted to a map. Easting was maintained by measuring and flagging 5 m increments and assigning sequential letters beginning with "a" on the field edge. The West and Central blocks were lettered from west to east and the East block was lettered from east to west.

Table 5 converts the Row number to Cartesian coordinates in meters North (Y axis), and the Square number to the beginning east coordinate (East prime in Table 5; X axis) for each Row. To convert each Square to its correct East grid coordinates, the square letter must first be digitized according to Table 6 and then the digitized square number must be added West and Central Blocks) or subtracted (East Block) from the beginning east coordinate for each provenience. This results in coordinates in the southwest corner of each unit controlling the northing and easting of each provenience.

From Table 5, it is apparent that a total of 1,403 units were collected. These were grouped on three different areas of the site: West, Central and East.

CULTURAL CONTEXTS

The West Block of the CSC was in areas which produced Woodland pottery and projectile points during testing. The Central Block collection skirted the Early Woodland component identified in testing and the East Block area skirted the Archaic and Woodland portion of the site.

Table 5. Conversion of Row to North and Identification of East Prime for Each Row.

West Block

Row	Square	North	East Prime	Row	Square	North	East Prime
1	8	360	20	29	10	220	5
2	8	355	20	30	10	215	7
3	8	350	20	31	10	210	9
4	8	345	20	32	10	205	12
5	8	340	20	33	10	200	14
6	8	335	20	34	10	195	19
7	8	330	19	35	10	190	22
8	8	325	18	36	9	185	26
9	8	320	16	37	11	180	30
10	8	315	15	38	14	175	33
11	8	310	15	39	16	170	36
12	8	305	14	40	18	165	40
13	8	300	12	41	19	160	44
14	8	295	10	42	21	155	49
15	8	290	8	43	22	150	54
16	8	285	7	44	21	145	57
17	8	280	5	45	21	140	62
18	8	275	4	46	21	135	70
19	8	270	4	47	20	130	80
20		865	3	48	21	125	95
21	9	260	3	49	31	120	105
22	9	255	2	50	30	115	117
23	9	250	1	51	29	110	128
24	10	245	1	52	28	105	140
25	10	240	1	53	28	100	147
26	10	235	2	54	25	95	160
27	10	230	2	55	22	90	173
28	10	225	3	56	10	85	254
Subtotal		744					

Table 5. (continued) Conversion of Row to North and Identification of East Prime for Each Row.

East Block

Row	Square	North	East Prime
60	8	175	508
61	10	170	523
62	11	165	525
63	15	160	545
64	16	155	547
65	17	150	555
66	18	145	558
67	18	140	560
68	11	135	563
69	11	130	565
70	8	125	569
71	8	120	570
72	8	115	571
73	8	110	572
74	8	105	575
75	8	100	577
76	9	95	581
80	10	90	585
81	10	85	589
82	10	80	595
83	10	75	600
84	10	70	605
85	10	65	607
86	10	60	612
87	10	55	615
88	10	50	622
89	11	45	625
90	11	40	632
91	9	35	635
92	11	30	642
93	11	25	647
94	11	20	652
95	11	15	654
96	11	10	655
97	8	5	655
98	11	0	655
99	10	135	346
Subtotal		397	

Central Block

Row	Square	North	East Prime
100	10	130	345
101	10	125	342
102	10	120	340
103	10	115	342
104	11	110	345
105	11	105	355
106	11	100	360
107	11	95	365
108	11	90	372
109	11	85	385
110	11	80	395
111	11	75	415
112	11	70	425
113	11	65	435
114	11	60	432
115	11	55	447
116	8	50	450
117	11	45	460
118	11	40	460
119	11	35	460
120	11	30	460
121	10	25	460
122	11	20	460
123	6	15	460
124	11	10	460
Subtotal		262	

Table 6. Digitization of Square Letters.

Square Number	Square Number
a = 5	p = 80
b = 10	q = 85
c = 15	r = 90
d = 20	s = 95
e = 25	t = 100
f = 30	u = 105
g = 35	v = 110
h = 40	w = 115
i = 45	x = 120
j = 50	y = 125
k = 55	z = 130
l = 60	aa = 135
m = 65	bb = 140
n = 70	cc = 145
o = 75	dd = 150
	ee = 155

If Row >59 and <99
Then East = East prime - Square Number

If Row <59 or >98
Then East = East Prime - Square Number

CHAPTER 6

ARTIFACT ANALYSIS

by

Robert H. Lafferty III

The artifacts recovered from the surface of 23SO496 were analyzed using the DELOS system. This system allows flexible categorization of recovered artifacts by characterizing them in a series of nested fields with different meanings. (An acronym dictionary is Appendix A in this report.) This section outlines the general nature of the DELOS fields and characterizes the artifact assemblage.

DELOS FIELDS

The DELOS system used by MCRA has five hierarchically nested fields which describe an artifact. Data are also included on provenience, counts, and weights of each identified artifact class. It is possible to use different intersects of these fields to discuss different levels of inclusion. For the 23SO496 artifacts, which were mainly prehistoric, these fields are:

	Prehistoric	Historic
Field 1	Major Artifact Class	Activity Class
Field 2	Specific Morphological	Specific Activity
Field 3	Morphofunctional	Artifact Name
Field 4	Qualifiers	Qualifiers
Field 5	Raw Material	Raw Material/Type

Additionally, Fields 6 and 7 can be used for the identification of specific named types of pottery, projectile points, and other artifacts. The level of specificity is related to what can be said of an artifact. The analysis can be carried to the level of inclusiveness desired or possible with a particular data base. The nested specificity is used to structure the description of the assemblage.

Major Artifact Classes - Field 1

The majority (84.5%) of the 1,319 artifacts recovered from the surface of the site (Table 7) were chipped lithics (CL). Unmodified raw material (URM) made up another 12.4% of the assemblage. Most of these artifacts were derived from locally available Crowley's Ridge gravels, supporting the hypothesis that lithic exploitation was the major reason the site was occupied. Considering that more than 95% of the artifacts were of local material, this is still a tenable hypothesis. Other recovered major classes included one animal bone, three mussel shell fragments, and two corn cob fragments, both probably modern. Only eight prehistoric potsherds were recovered in the controlled surface collection, all concentrated at the west end of the site. Five ground lithic artifacts were recovered.

Nineteen historic artifacts were recovered on the surface. These included domestic artifacts (DOM), generalized other historic material (OHIST) not ascribable to any functional type, and structural parts (STRUCT) - mainly nails.

Table 7. Field 1, Major Artifact Classes Recovered from 23SO496 by Counts.

FIELD1	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	2	.	.	.
ANIM	1	0.1	1	0.1
CG	1	0.1	2	0.2
CL	1115	84.5	1117	84.7
FLOR	2	0.2	1119	84.8
DOM	6	0.5	1125	85.3
GRL	5	0.4	1130	85.7
OHIST	3	0.2	1133	85.9
POT	8	0.6	1141	86.5
SHELL	3	0.2	1144	86.7
URM	164	12.4	1308	99.2
STRUCT	10	0.8	1318	99.9
FOSSIL	1	0.1	1319	100.0

Comparing the major artifact class distribution by weights (Table 8) indicates that CL and URM still make up 95.5% of the assemblage; however 54% is URM when categorized by weight. This indicates, not surprisingly, that the large cobbles and chunks weigh more than the artifacts reduced out of them. That ground lithics (GRL) are 3.6% of the assemblage by weight (but only 0.4% by count) is also consistent because these are much larger and heavier than flaked artifacts.

Table 8. Field 1, Major Artifact Classes Recovered from 23SO496 by Weights.

FIELD1	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	65613.4	.	.	.
ANIM	0.6	0.0	0.6	0.0
CG	13.5	0.0	14.1	0.0
CL	17655.1	40.9	17669.2	40.9
FLOR	4.5	0.0	17673.7	41.0
DOM	33.3	0.1	17707	41.0
GRL	1541.5	3.6	19248.5	44.6
OHIST	7.7	0.0	19256.2	44.6
POT	14.4	0.0	19270.6	44.7
SHELL	15.6	0.0	19286.2	44.7
URM	23545	54.6	42831.2	99.2
STRUCT	307.7	0.7	43138.9	100.0
FOSSIL	16	0.0	43154.9	100.0

Unmodified Raw Materials are composed mainly of chert and quartzite cobbles and show no signs of battering or intended flake removal. These cobbles are available in gravel bars in the river adjacent to the site. Their ultimate geologic sources are several upstream locations where the river has been actively eroding Crowley's Ridge.

Specific Morphological - Field 2

This field gives greater specificity to the artifact classes (Tables 9 and 10). Note that in the DELOS system it is not necessary to include all fields in all artifact types. Most of the 203 items which lack morphological specificity are unmodified raw material. Eighty-six percent of the assemblage is composed of flakes (FLA) and shatter (SHAT), mainly byproducts of lithic reduction. Almost 6% of the assemblage is cores.

Table 9. Field 2, Specific Morphological Classes Recovered from 23SO496 by Counts.

FIELD2	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	178	.	.	.
BIFK	10	0.9	10	0.9
BODY	8	0.7	18	1.6
CHNK	7	0.6	25	2.2
COBL	18	1.6	43	3.8
COBTO	13	1.1	56	4.9
CORE	71	6.2	127	11.1
DEBIT	2	0.2	129	11.3
FLA	830	72.6	959	83.9
FOODPREP	4	0.3	963	84.3
HARDW	5	0.4	968	84.7
PEBL	5	0.4	973	85.1
PPK	15	1.3	988	86.4
SHAT	154	13.5	1142	99.9
SUBS	1	0.1	1143	100.0

Cores are siliceous materials which have had flakes removed. At this site virtually all were cobbles or pebbles of chert and quartzite apparently locally derived from Crowley's Ridge. There was great variation in the nature of those recovered (Figure 12) from "tested" cobbles, with one flake removed to multi-faceted cores reduced to an unflakable mass. Most of the cores exhibit fracture planes, have few flakes removed, and are not heat-treated.

Table 10. Field 2, Specific Morphological Classes Recovered from 23SO496 by Weights

FIELD2	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	88091.1	.	.	.
BIFK	334.6	1.6	334.6	1.6
BODY	14.4	0.1	349	1.7
CHNK	1274.2	6.2	1623.2	7.9
COBL	4101.3	19.8	5724.5	27.7
COBTO	1763.4	8.5	7487.9	36.2
CORE	6798.1	32.9	14286	69.1
DEBIT	36.2	0.2	14322.2	69.3
FLA	2924.5	14.1	17246.7	83.4
FOODPREP	9.5	0.0	17256.2	83.5
HARDW	210.9	1.0	17467.1	84.5
PEBL	260.1	1.3	17727.2	85.7
PPK	85.8	0.4	17813	86.1
SHAT	2860	13.8	20673	100.0
SUBS	4.2	0.0	20677.2	100.0

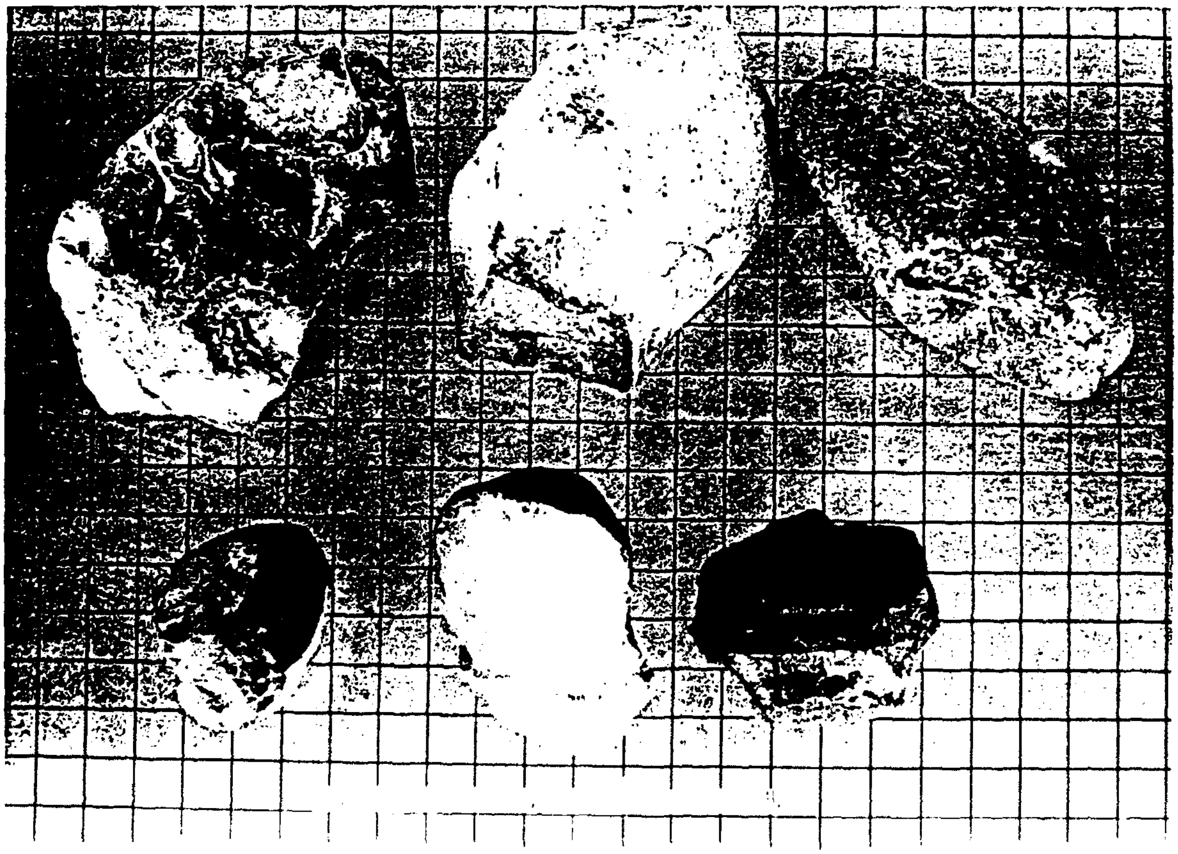


Figure 12. Cores recovered at 23SO496.

Flakes are removed from cores by striking or by exerting heavy pressure on a core, cobble tool or biface/projectile point. The 830 recovered flakes constituted 72% of the assemblage. Flakes exhibit bulbs of percussion and compression rings. This contrasts with shatter and debitage which are siliceous stone that has apparently been flaked but that lacks a bulb of percussion or compression rings. These categories are a common byproducts from the production of flakes and bifaces by percussion and pressure.

Biface (BIFK) is the earliest stage of reduction recognizable is this analysis. It is characterized by a bifacial edge defining the coronal plane (see Futato 1983: Appendix A for definitions of primitives employed here). There are three general stages recognized here: Stage 1 with incomplete margins, often with cortex remaining, and large broad flake scars. Stage II possesses more or less complete margins, flake scars are generally smaller, with little or no cortex remaining. The edge appears sinusoidal in cross section. Stage III bifaces are characteristically more finished than the early stage bifaces, with smooth margins and a pear shaped coronal plane. Very little reduction is need to move from a Stage III biface to the finished product.

Morphofunctional Categories - Field 3 (Table 11 and 12)

This level of the hierarchy breaks out the specific tool types recovered in the assemblage. Table 11 excludes the previously discussed categories from the totals, resulting in 56 identifiable tools recovered from the site. Fifteen of these are historic artifacts (bolt, nutbolt, nail,plate, body, and base - the latter two being glass). The prehistoric tool assemblage is dominated by spokeshaves (13) and projectile points (12 - arrow and dart).

Table 11. Field 3, Morphofunctional Artifact Classes Recovered from 23SO496 by Counts.

FIELD3	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1265	.	.	.
ARROW	2	3.6	2	3.6
BASE	1	1.8	3	5.4
BODY	1	1.8	4	7.1
BOLT	6	10.7	10	17.9
BOTTLE	1	1.8	11	19.6
CHOP	5	8.9	16	28.6
DART	10	17.9	26	46.4
END	1	1.8	27	48.2
GRIP	2	3.6	29	51.8
HAM	3	5.4	32	57.1
NAIL	3	5.4	35	62.5
NUTBOLT	1	1.8	36	64.3
PERF	1	1.8	37	66.1
PITS	1	1.8	38	67.9
PLATE	2	3.6	40	71.4
POUND	1	1.8	41	73.2
SCR	1	1.8	42	75.0
SPOKS	13	23.2	55	98.2
ST2	1	1.8	56	100.0

FIELD32	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1320	.	.	.
HAM	1	100.0	1	100.0

Spokeshaves are lithic tools exhibiting an indentation on one or more edges and characterized by many small flake scars on the steep edge. In the plowzone it is possible that some of these were produced by plowing; however most have well developed edges characteristic of utilization as tools. One of the inferred functions of these tools is making weapons shafts.

Scrapers are beveled tools, often made from a flake, and are formed by a continuous line of steep use-wear on one or more edges. One end and one side scraper were recovered.

Grips are ground and pecked tools. Two were recovered. This is a general category which could not be sorted more specifically. One ground stone tool also had characteristics of a hammer.

Hammers are ground stone tools which exhibit evidence of battering. A total of four hammers were recovered, including the multiple use tool described above. All were of chert and quartzite and had the battering characteristic of hammers used in the early stages of lithic reduction.

Pounders are rounded ground stone which were apparently used to pound on flexible solids producing an abraded surface.

Table 12. Field 3, Morphofunctional Artifact Classes Recovered from 23SO496 by Weights.

FIELD3	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	105404	.	.	.
ARROW	1.5	0.0	1.5	0.0
BASE	2.7	0.1	4.2	0.1
BODY	4.5	0.1	8.7	0.3
BOLT	112.3	3.3	121	3.6
BOTTLE	3.7	0.1	124.7	3.7
CHOP	839.9	25.0	964.6	28.7
DART	74.7	2.2	1039.3	30.9
END	1	0.0	1040.3	30.9
GRIP	233.6	6.9	1273.9	37.9
HAM	803.8	23.9	2077.7	61.8
NAIL	54.7	1.6	2132.4	63.4
NUTBOLT	140.7	4.2	2273.1	67.6
PERF	27.8	0.8	2300.9	68.4
PITS	456.8	13.6	2757.7	82.0
PLATE	5.3	0.2	2763	82.1
POUND	453.1	13.5	3216.1	95.6
SCR	36	1.1	3252.1	96.7
SPOKS	82.8	2.5	3334.9	99.1
ST2	29.4	0.9	3364.3	100.0

FIELD32	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108582	.	.	.
HAM	186.4	100.0	186.4	100.0

Choppers are cores that have had only a few flakes removed to form a crude cutting edge. The early Australopiticines are noted for using them in Africa; however their use continued throughout the stone ages, as evidenced by the five recovered at 23SO496.

Pitted cobbles {PITS} have hemispherical depressions in one or more surfaces and were used to crack nuts. Only one of these tools was recovered in the archeological operations (Table 11).

Qualifiers - Field 4

These are open-ended characterizations of different artifacts and are used for various kinds of analysis. In this analysis, 978 items had qualified characterizations. Qualifiers were applied to five morphofunctional or material categories: projectile point/knife, flakes, pebbles, pottery, and glass.

Table 13. Field 4, Qualifiers Recovered from 23SO496 by Counts.

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	343	.	.	.
CLEAR	3	0.3	3	0.3
CNTRST	2	0.2	5	0.5
CORDMARK	1	0.1	6	0.6
DECORT	184	18.8	190	19.4
EXPNST	1	0.1	191	19.5
G	78	8.0	269	27.5
GREEN	1	0.1	270	27.6
INTERIOR	570	58.3	840	85.9
LESS	5	0.5	845	86.4
MOLD	1	0.1	846	86.5
PLAIN	2	0.2	848	86.7
POLISH	3	0.3	851	87.0
RUM	74	7.6	925	94.6
SFTLP	5	0.5	930	95.1
SIDENT	1	0.1	931	95.2
SLIP	4	0.4	935	95.6
STL	1	0.1	936	95.7
TESTED	42	4.3	978	100.0

Projectile point/Knife qualifiers are concerned with notching and stem morphology. Two contracting stemmed, one expanding stemmed, one corner notched, and one side notched projectile point were recovered. These relate to named types and are discussed in greater detail later in this chapter (Table 13).

Glass was categorized by color - clear and green - and the four bottle necks recovered had seams extending from the bottom through the lip (S-lip).

Pottery qualifiers in the assemblage were plain (Barnes sand tempered) except for one molded whiteware sherd.

Pebbles were tested in 36 instances in the collection.

Flakes were identified as decortication, interior, softlip, and retouched/utilized/modified (RUM). These flake types have important implication for the lithic reduction which was taking place on the site.

Table 14 presents the types of flakes recovered in the controlled surface collection. Decortication flakes are removed from the exterior of a nodule of chert and, in this analysis, have cortex over more than 90% of its dorsal surface. Decortication flakes are indicative of early stages of lithic reduction.

Interior flakes are flakes with less than 10% cortex or no cortex on their dorsal surface. These flakes are produced as primary flakes after more than one decortication flake has been produced but quite often are byproducts of all flaking.

Table 14. Flake Types Recovered from 23SO496 by Counts.

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DECORT	179	21.6	179	21.6
INTERIOR	570	68.7	749	90.2
POLISH	1	0.1	750	90.4
RUM	71	8.6	821	98.9
SFTLP	5	0.6	826	99.5
SLIP	4	0.5	830	100.0

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	795	.	.	.
DECORT	20	57.1	20	57.1
RUM	13	37.1	33	94.3
SFTLP	2	5.7	35	100.0

Table 15. Flake Types Recovered from 23SO496 by Weights.

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DECORT	1366.8	46.7	1366.8	46.7
INTERIOR	1113.5	38.1	2480.3	84.8
POLISH	4	0.1	2484.3	84.9
RUM	425.9	14.6	2910.2	99.5
SFTLP	11.3	0.4	2921.5	99.9
SLIP	3	0.1	2924.5	100.0

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	2596.8	.	.	.
DECORT	182.4	55.7	182.4	55.7
RUM	142.7	43.5	325.1	99.2
SFTLP	2.6	0.8	327.7	100.0

Softlip flakes have a distinctive lip above the bulb of percussion at the platform. These flakes are produced late in lithic reduction sequence, by the use of s soft hammer (e.g. wooden baton, hammerstone with limestone cortext).

The distribution of these different types of flakes by weight (Table 15) shows 46% of them to be decortication flakes, 38% interior, and only 0.4% softlip. By count only 21% of the flakes are decortication flakes, indicating that decortication flakes are heavier than interior flakes.

The distribution of flake types suggest that early stages of lithic reduction were being performed at 23SO496. Of the flakes recovered 21% were decortication flakes. This low percentage is rather difficult to interpret given that the sample includes only the peripheries of the site. Other confounding variables include variation in cortex at flint sources, flint procurement strategies and differences in the lithic technologies involved. Data from the County Line site (a nine acre site on the southern Stoddard County line 37 km south of 23SO496) had 41% decortication flakes (Teltser 1988). This was a surprisingly high percentage for a center (cf. Lafferty 1977) located 5 km from Crowley's Ridge - the closest flint source. The Eaker Site, 3MS105, a large 70 acre Nodena phase site near Blytheville, had 56.8% decortication flakes in its controlled surface collection. Both of these sites are large Mississippian centers at a greater distance from the chert sources than 23SO496.

23SO496 has artifacts spanning Homo Tempus. This suggests that the CSC contains several different procurement strategies and technologies. Precisely what effects this has had on the archeological record is difficult to perceive.

Table 16. Percentages of Flake Types.

	Decortication	Interior	Softlip	RUM	Total
3MS105	56.8	37.0		6.1	832
County Line	27.6	37.1	5.7	29.5	579
3RA78	34.5	65.5		1.4	2414
23SO496	21.6	68.7	0.6	8.6	830
3NW205, House	4.1	89.5	6.0	0.4	8724
3WA58					
Miss., White	5.1	85.7	8.7	0.4	952
Rd. Mt. White	5.4	88.8	5.1	0.7	5905
Gray	1.0	89.4	8.0	1.1	1735
					21,971

References 3MS105: Lafferty and Cande 1989; County Line: Teltser 1988; 3RA78: Lafferty et al. 1986; 3NW205: Lafferty et al. 1988b; 3WA58: Lafferty et al. 1988a. Abbreviations: Miss.=Mississippi period; Rd. Mt.=Round Mountain Phase, last half of the Late Archaic.

Table 16 presents flake types for several recently investigated sites in the Central Mississippi Valley (3MS105, County Line, and 23SO496) and the Ozarks (3RA78, 3NW205 and 3WA58). One major difference is that all of the valley sites have more than 5% obviously utilized (RUM) flakes, while the upland sites have very low percentages of utilized flakes. All of the lowland sites have lower total flake counts than the upland sites, suggesting that this is a factor of chert availability. While these numbers do not control for the totals of areas excavated or collected, they suggest that, because of the lower availability of chert in the Lower Mississippi Valley, what was extracted was utilized more intensively than in the Ozarks where chert was much more available. MCRA was quite surprised to find a very low density of flake utilization at 3WA58 and 3NW205 and hypothesized that it was a function of chert's availability: reuse of flakes was not necessary. Even flakes which appeared to be macroscopically used were not counted as utilized when examined microscopically (Santeford 1988a, 1988b). Micropolish analysis will likely result in identification of many more tools which were used only briefly.

MCRA found the low density of decortication flakes in the upland sites also surprising. At 3WA58 this was thought to be a function of the chert being available in noncorticoid vein chert. At 3NW205 the apparent explanation was the domestic nature of the site with primary reduction being conducted more proximally to the source. The near absence of gray chert decortication flakes at 3WA58 appears to be for the same reasons. While these results are suggestive, more sites are necessary to make them statistically significant.

Another variable not controlled for is the changing technologies. The higher percentages of decortication flakes at the two Mississippian centers may be the result of changing lithic procurement in this period. Specifically, House (1986) has hypothesized that, during the Mississippi period in south Arkansas, riverine cobbles became an adequate source of flint because of the change to the bow and arrow and the introduction of celts for dismembering animals. To determine this will require excavated and dated contexts from a large number of sites.

Raw Material - Field 5

The most common material types recovered at the site were chert (Table 17) and quartzite. Both were locally available in the gravel bar and presumably were a principal attraction of the site. The 19 kg of unidentified material are small pieces of fire-cracked rock which were both chert and quartzite. There is a much lower diversity of flint types at 23SO496 than at either of the two Mississippian centers. At 23SO496, the only certain exotics were one piece of Pitkin chert, four quartz flakes, and 13 thinning flakes of orthoquartzite (Table 18).

REDUCTION FAILURES

Four of the ten recovered bifaces appear to be reduction failures which were discarded after breakage.

97-3 is the base of a biface II which broke during heat treating as evidenced by the incomplete color change and a heat-crazed surface covering the break. 110-3 also apparently broke during heat treating but did have some post-heating flakes removed. One flakescar is 2/3 lustrous and 1/3 matte, which raises questions as to the thoroughness of the heat treating.

Artifact 75-3 is between a biface I and biface II which had been heat-treated; at least three flakes were removed before one failed to carry across the face of the numbered side.

Table 17. Field 5, Raw Material Recovered from 23SO496 by Counts.

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1285	.	.	.
DECORT	20	55.6	20	55.6
RUM	13	36.1	33	91.7
SFTLP	2	5.6	35	97.2
VEXBS	1	2.8	36	100.0

FIELD43	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1320	.	.	.
CORNT	1	100.0	1	100.0

RAW MATERIAL

FIELD5	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	8	.	.	.
BONE	1	0.1	1	0.1
COAL	2	0.2	3	0.2
CONG	2	0.2	5	0.4
CORNCOB	1	0.1	6	0.5
CRT	1204	91.7	1210	92.2
EARTHW	1	0.1	1211	92.2
FERS	5	0.4	1216	92.6
GLASS	4	0.3	1220	92.9
GRAPH	1	0.1	1221	93.0
GROG	1	0.1	1222	93.1
METAL	5	0.4	1227	93.5
NOV	2	0.2	1229	93.6
OQZ	13	1.0	1242	94.6
PEARLW	1	0.1	1243	94.7
PITK	8	0.6	1251	95.3
QTZ	6	0.5	1257	95.7
QXL	1	0.1	1258	95.8
QZIT	46	3.5	1304	99.3
SAND	7	0.5	1311	99.8
WHITEW	2	0.2	1313	100.0

FIELD52	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1319	.	.	.
QZIT	2	100.0	2	100.0

Table 18. Field 5, Raw Material Recovered from 23SO496 by Weight.

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108429	.	.	.
DECORT	182.4	53.7	182.4	53.7
RUM	142.7	42.0	325.1	95.7
SFTLP	2.6	0.8	327.7	96.5
VEXBS	11.9	3.5	339.6	100.0

FIELD43	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108756	.	.	.
CORNT	11.9	100.0	11.9	100.0

RAW MATERIAL

FIELD5	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	19450.9	.	.	.
BONE	0.6	0.0	0.6	0.0
COAL	4.8	0.0	5.4	0.0
CONG	141.4	0.2	146.8	0.2
CORNCOB	4.2	0.0	151	0.2
CRT	81288.9	91.0	81439.9	91.2
EARTHW	2.7	0.0	81442.6	91.2
FERS	96.8	0.1	81539.4	91.3
GLASS	29.3	0.0	81568.7	91.3
GRAPH	2.2	0.0	81570.9	91.3
GROG	1	0.0	81571.9	91.3
HEM	1.1	0.0	81573	91.3
IG	12	0.0	81585	91.3
METAL	210.9	0.2	81795.9	91.6
NOV	0.2	0.0	81796.1	91.6
OQZ	324.8	0.4	82120.9	91.9
PEARLW	1.3	0.0	82122.2	91.9
PITK	61.1	0.1	82183.3	92.0
QTZ	548	0.6	82731.3	92.6
QXL	146.7	0.2	82878	92.8
QZIT	5548.7	6.2	88426.7	99.0
SAND	13.4	0.0	88440.1	99.0
SS	871.8	1.0	89311.9	100.0
WHITEW	5.5	0.0	89317.4	100.0

FIELD52	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108735	.	.	.
CRT	15.3	46.4	15.3	46.4
QZIT	17.7	53.6	33	100.0

Artifact 342-3 is a distal tip of a large preform made of heated Crowley's Ridge gravel (CRG). The numbered face of the blade had been flaked after heat-treating. Flaking had progressed to the lower right. Upon the attempt to remove the last bit of cortex on the other side, the piece snapped with a ditrapozodial-centered hinge fracture.

While researchers cannot control for changing technology, it is inferred that heat treating was taking place between biface I and biface II stages of reduction. There seems to be some variation, ellow Creek and Cedar Creek in the Tennessee Valley, the same heat treating reduction stage was applied (cf. Johnson 1981; Futato 1983).

From a temporal point of view, it is possible that the increase in size of projectile points in the Middle to Late Archaic period was a factor of the development of heat treating. At least, the only points of Crowley's Ridge gravels recovered from 23SO496 which have not been altered are apparently Early-Middle Archaic. Impressionistically, many of the sites in the New Madrid Floodway, seemingly from early periods, have less heat treated chert than sites from the ceramic periods.

TEMPORALLY DIAGNOSTIC ARTIFACTS

Ceramics

Eight prehistoric potsherds were recovered. All were very small and collected in the West Block. One sherd is grog tempered (cf. Baytown, Phillips, Ford and Griffin 1951; and Phillips 1970). The other seven are sand-tempered Barnes pottery (Williams 1954; Price and Price 1984). These sherds are all Woodland period and have been traditionally interpreted as Late Woodland period, though recent research suggests they may extend back into the Middle Woodland, especially the cordmarked varieties (cf. Lafferty et al. 1987; Spears 1988). Two sherds are cordmarked (Figure 13:a and b).

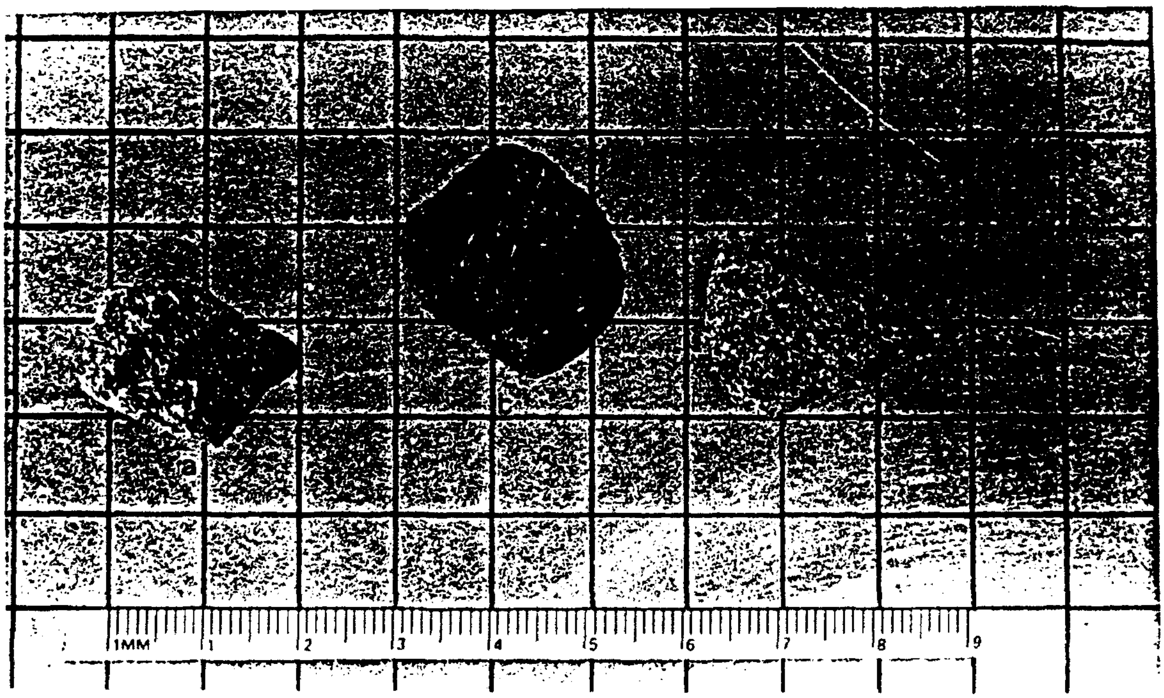


Figure 13. Diagnostic sherds recovered from 23SO496.

Projectile Point/Knives

Thirty-one identifiable projectile points were recovered in the testing project (Chapter 3).

The distribution of artifacts from the testing project suggests that the controlled surface collection intersects the edges of the following components: a Late Archaic to Woodland component in the west section and Woodland, Late Archaic, and Early Archaic components in the East and Central Blocks.

A total of twelve projectile points were recovered in the 1988 CSC. Five typable points and fragments were recovered in the east collection block and three in the west. Measurements are presented in Table 19.

One Corner Notched point was recovered from the West Block (Figure 14 a). This is not referable to any specific type but appears to fit into the Early to Middle Archaic period horizons. The point is made of unheat-treated Crowley's Ridge gravel.

Delhi. One possible fragment of this type (Figure 14 e) was recovered from the West Collection Block. This was so fragmentary that its typing is not certain although it probably dates to the Late Archaic time period.

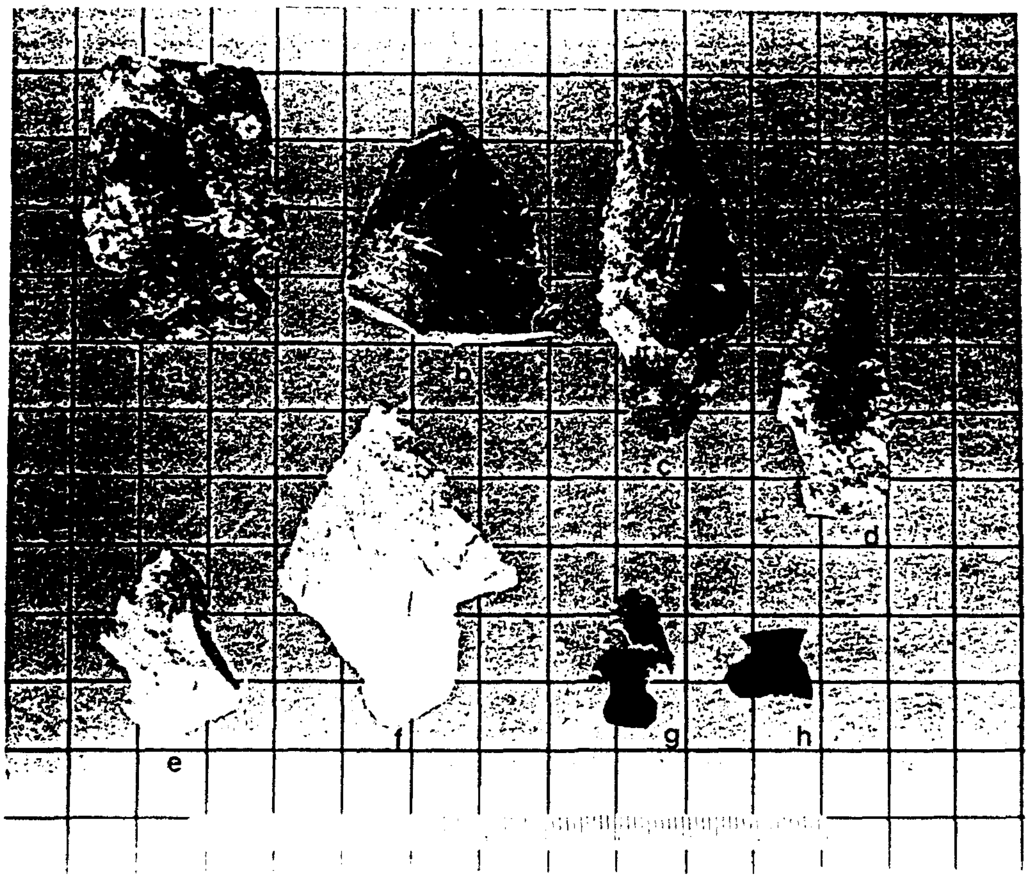


Figure 14. Projectile points recovered from 23SO436.

Langtry points date to the Late Archaic period. One, recovered from the East Collection Block (Figure 14 f), is made of fine-grained, pinkish-white chert which appears to have been heat treated.

Table Rock Side Notched/ Crude Side Notched/ Kincaid Type IV were recovered in the East Block and one in the West Block. Artifact 84-6 (Figure 14 c), made of heat-treated Crowley's Ridge gravel, still exhibits the prime flake scar on one side. It is weakly side notched and appears to have been the work of an unskilled individual.

370-4 (Figure 14 d) was also made of Crowley's Ridge gravel and is at most only slightly heat treated. It has basal impact fractures and exhibits the prime flake contours, though the prime surface has been totally recontoured.

439-1 is made of a banded chert, possibly of Crowley's Ridge gravel. Symmetrically oriented with a cryptocrystalline band in the center, it has two tan chert bands on the lateral edges. Only its base was recovered.

One Scallorn was recovered in the East Block (Figure 14 g). Made of red, heat-treated Crowley's Ridge gravel with the prime flake scar still present on one side, its heat treating took place after the prime flake was removed but before the point was made. This point dates to the Emergent and Early Mississippian 600-1100 A.D.) in the southwest Ozarks and the Missouri Bootheel (Price and Price 1984), if the type assignment is correct and this is not a manufacturing fluke caused by inexperience.

Table 19. Projectile Point and Biface Measurements.

Type/Catolog	#	Length	Thickness	Width	T/W	HJW	Weight
Preforms							
	75-3		1.54	4.14	.37		29.4
	97-3		1.24	3.73	.33		12.0
	110-3		0.87	4.06	.21		9.7
	342-3		0.78	3.18	.25		8.4
Dart Points							
Corner nothced	27-1	4.2	0.90	3.10	.29	1.93	11.9
Langtree	319-7	4.80	0.58	3.94	.15	1.73	8.0
Late Woodland	84-6	5.65	0.72	2.30	.31	12.7	7.5
	370-4	4.04	0.73	1.83	.40	1.21	4.8
Arrow Points							
Scallorn	359-1	2.05	0.54	1.26	.43	0.60	1.0
Shugtown	354-3		0.36	1.10	.33	0.74	0.55

Abbreviations: T/W = Thickness/width; HJW = Haft Element Juncture width.

Shugtown? Reed. The base of the only specimen possibly assignable to this type was recovered in the East Block. The specimen was made of Pitkin chert (Figure 14 h) which is available in restricted areas in the southern Ozarks in Arkansas, the closest outcrops being near Oil Trough, 120 miles to the southwest. This side notched style made on a cornered preform is commonly associated with the Middle Mississippian (1000-1200 A.D.; Perino 1985:320;347) manifestations of northeast Arkansas (Morse and Morse 1983).

Table 20. Complete Projectile Points from 23SO496, All Collections.

	N	Total	Average Weight	Percent Prehistoric
Early Archaic		5	8.9 g	19.2
Big Sandy	2			
Kirk Corner Notched	1			
Graham Cave	1			
Rice Lobed	1			
Middle Archaic - Late Archaic		9	15.6 g	34.6
Stone Square Stem	8			
Corenr Notched	1			
Late Archaic		3	10.5 g	11.5
Delhi	2			
Langtry	1			
Woodland		8	6.3 g	30.8
Steuben	4			
Rice Side Notched	2			
Kincaid IV	2			
Mississippian		1	1.0 g	3.9
Scallorn	1			
Historic				
.32 Cal. musket	1		5.0 g	
Total (Prehistoric)		26		100.0

The diagnostic artifacts recovered represent most of the archeological continuum from Early Archaic to Mississippian. Based on the testing report, the arrow points were not expected (Lafferty et al. 1985). In the weights presented in Table 20, only weights of largely complete specimens are included. All points were included from both the CSC and the testing project.

Point types suggest heavy use of the site in the Archaic and Woodland periods.

The increase in point size from Early to Middle-Late Archaic times has several interesting ramifications and implications. In the first place, because these are exhausted points, the increase in size could represent a change in the technology whereby it became cheaper to produce large points. Such a change might be related to beginnings of thermal alteration of Crowley's Ridge gravels.

Another possible explanation could be a change in the settlement pattern or seasonal round, whereby 23SO496 was included more frequently, thereby decreasing the time a particualr weapon was used.

The averaged weights by periods suggest there was a steady ephemeralization of the final point used up form, from Middle Archaic through Mississippian. This constant decrease in point size probably was driven by a decreasing availability of chert. It is possible that, the halving of point weight in the Woodland was coupled with other changes in the atlatl dart technology, such as spear weight increases, more flexible atlatl shafts, or more effective bannerstones. These possibilities will have to be explored by specific hypothesis testing on excavated materials.

The introduction of the bow and arrow greatly reduced the demand for flint by almost a magnitude. In all probability this made much more flint usable and effective.

ARTIFACT DISTRIBUTIONS

Because the CSC only was made on the edges of the site, the collection may not be representative of the total variation present on the site. The rare artifacts occur in low density.

A major implication is that we are only dealing with the most ubiquitous artifacts present in the 23SO496 assemblage. We do not have total assemblages representative of the range of artifacts from any one component. The fact that we have different time periods represented in the CSC implies that we are not dealing with segregated assemblages, another problem of interpretation. Nevertheless, inferences are possible concerning the utilization of the site over a long period of time as a place with point bound resources - chert.

The West Collection Block merely gave some indication of the southwest site limits. The north 80 meters of this collection block intersected a part of the site that produced contourable results of chipped lithics.

The highest density of lithics was between 300-330N. This concentration also had all of the cores (Figure 16) and the highest density of flakes (Figure 17). This centroid is not the same as for URMS which were concentrated between 320-360N (Figure 18), implying that they were used in mutually exclusive activities. This is further confirmed by the correlation coefficients and Chi square test run between URM and CL resulting is a nonsignificant correlation coefficient (Table 21).

It is probable that the west and east ends of the site represent different reduction technologies. The preponderance of diagnostic artifacts found on the west end of the site are Late Archaic to Woodland. On the east end in the collection area the diagnostics include Late Archaic, Middle Archaic, Woodland and Mississippian points, and one hoe flake found in the testing project. The testing project indicated that there are stratified deposits in the central part of the east end of the site in an area not covered by the CSC. Coupled with the fact that Archaic points found in the east end were on the south slope it is probable that the concentration recovered in the CSC is Mississippian and might be profitably compared to the west end of the site. Unfortunately, data from this mitigative effort are not sufficient to carry out this analysis.

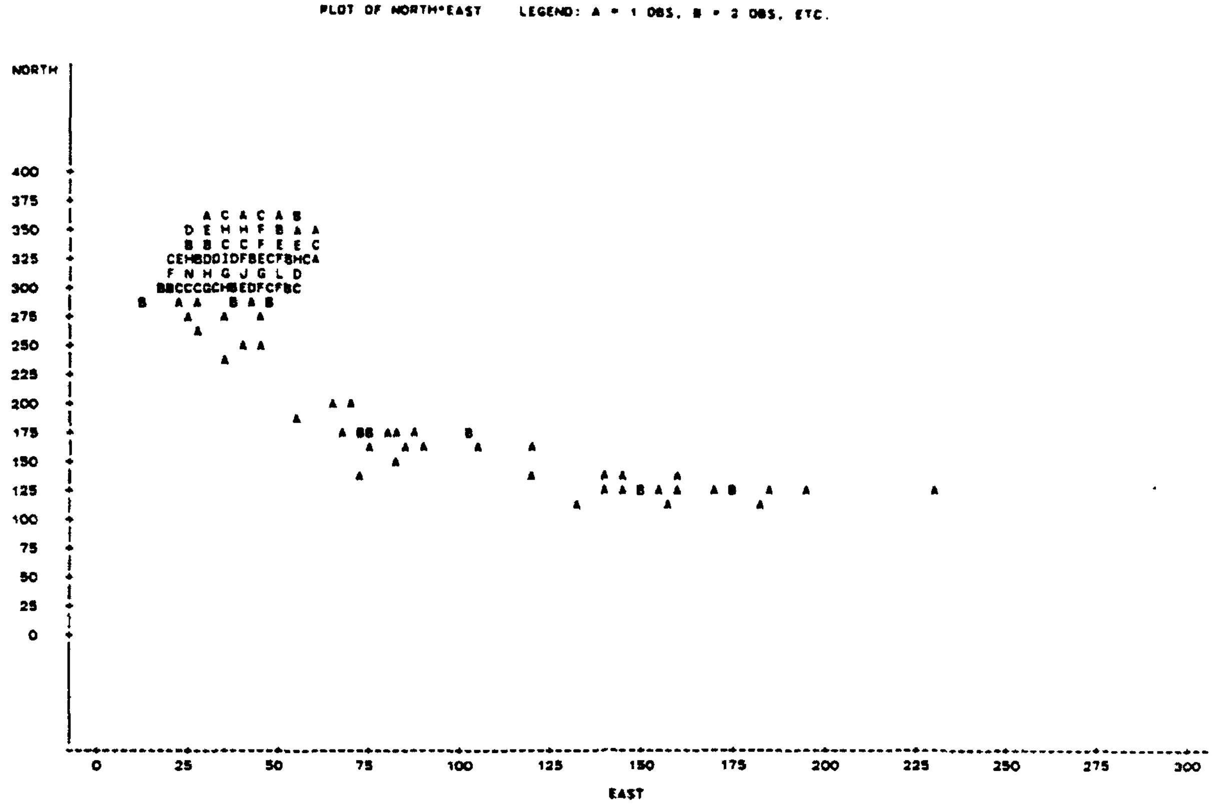


Figure 15. West Block, chipped lithics.

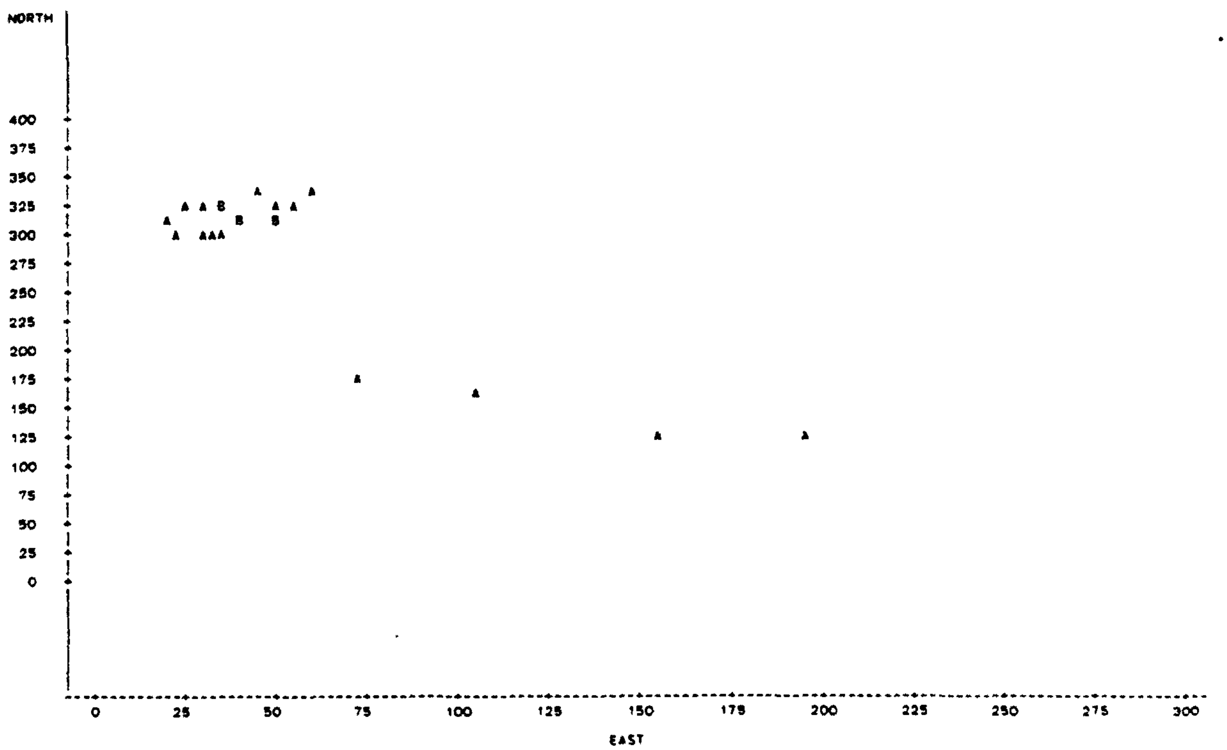


Figure 16. West Block, cores.

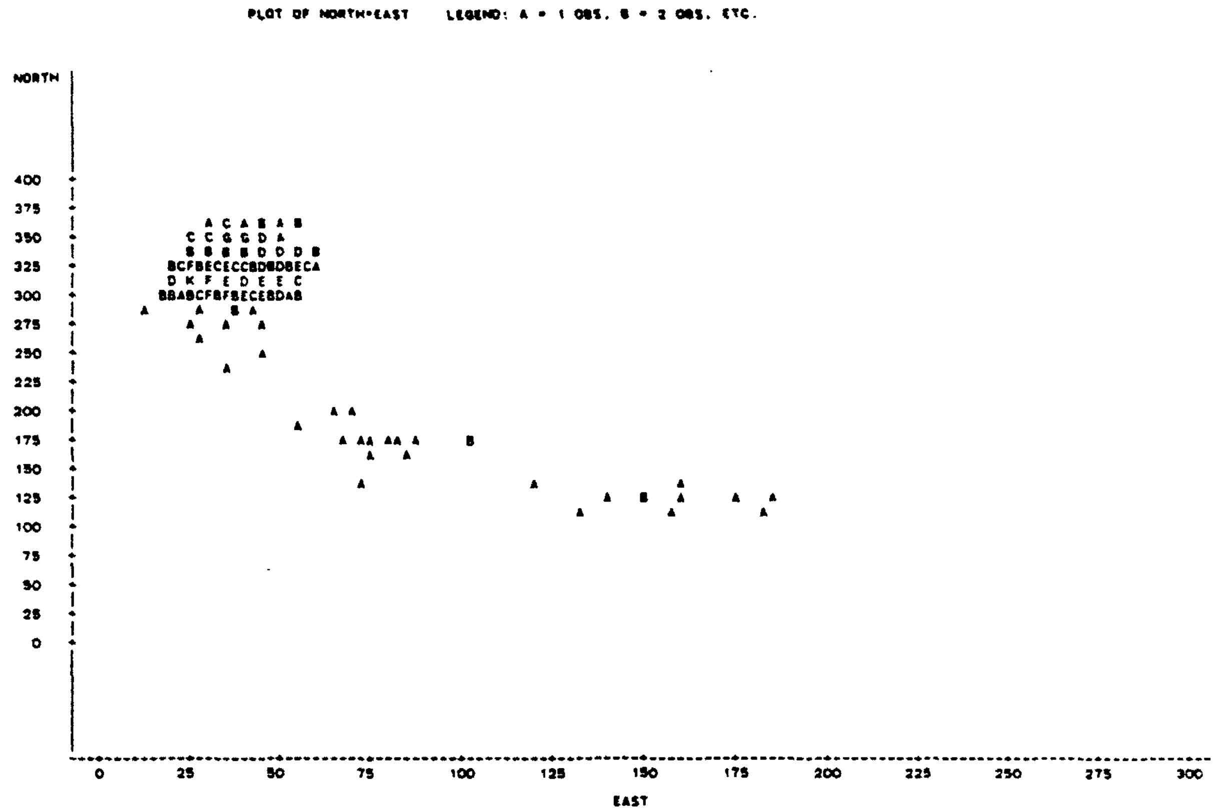


Figure 17. West Block, flakes.

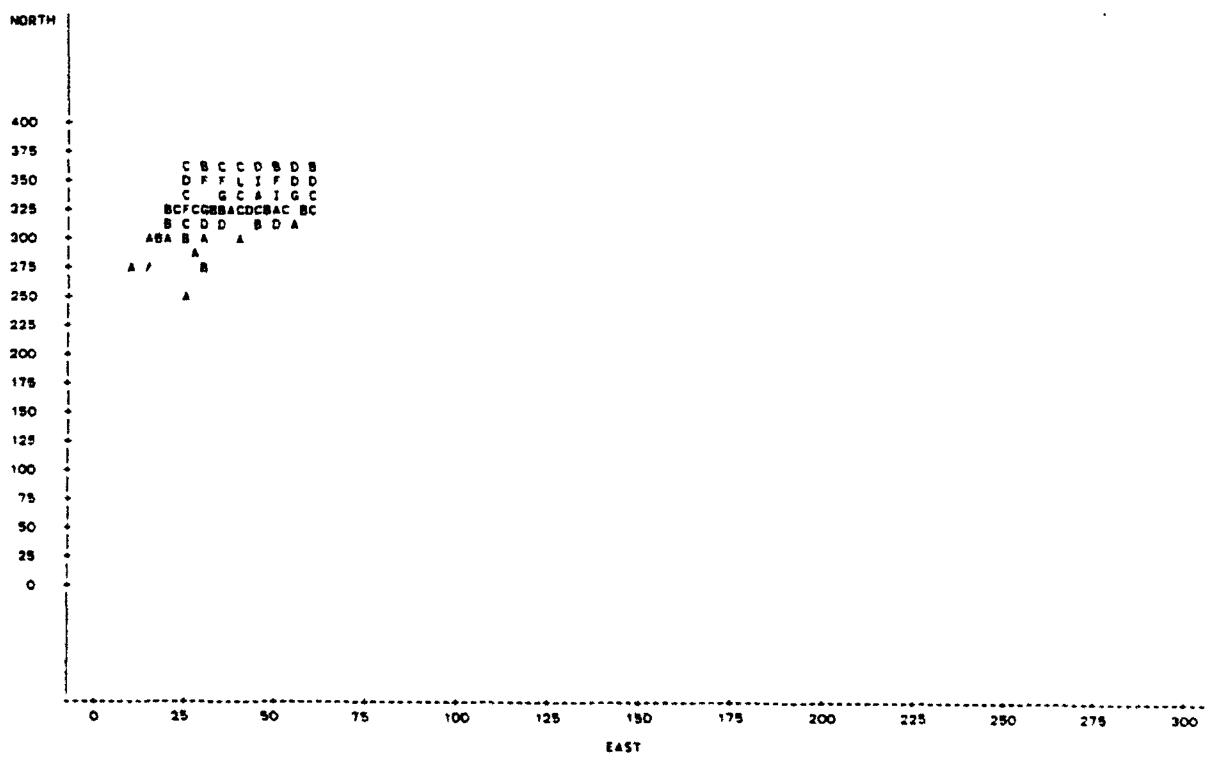


Figure 18. West Block, distribution of URM.

Table 21. Correlation of Utilized Raw Material with Chipped Lithics.

STATISTIC	DF	VALUE	PROB
CHI-SQUARE	63	139.322	0.000
LIKELIHOOD RATIO CHI-SQUARE	63	109.982	0.000
MANTEL-HAENSZEL CHI-SQUARE	1	1.706	0.191
PHI		0.666	
CONTINGENCY COEFFICIENT		0.554	
CRAMER'S V		0.252	

SAMPLE SIZE = 314
WARNING: 85% OF THE CELLS HAVE EXPECTED COUNTS LESS THAN 5. CHI-SQUARE MAY NOT BE A VALID TEST.

CASTOR RIVER - 23S0496

COVARIANCE MATRIX

	URMCOUNT	CLCOUNT
URMCOUNT	1.51699	0.13155
CLCOUNT	0.13155	2.09256

CASTOR RIVER - 23S0496

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
URMCOUNT	314	0.6082803	1.2316623	191.00000	0	7.000000
CLCOUNT	314	2.0095541	1.4465684	631.00000	0	10.000000

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER H0:RHO=0 / N = 314

	URMCOUNT	CLCOUNT
URMCOUNT	1.00000 0.0000	0.07383 0.1919
CLCOUNT	0.07383 0.1919	1.00000 0.0000

The east collection block revealed one concentration of lithics with contourable densities. However there was a total absence of unmodified raw material, which would be expected if this is indeed a different, later component. It is apparent that the southern part of the concentration is defined by the CL contour (Figure 19). Over one third of the cores recovered (25/71) were found in this artifact concentration (Figure 20). There is also a high degree of co-occurrence of flakes and cores (Figure 21) expectable on a lithic reduction site.

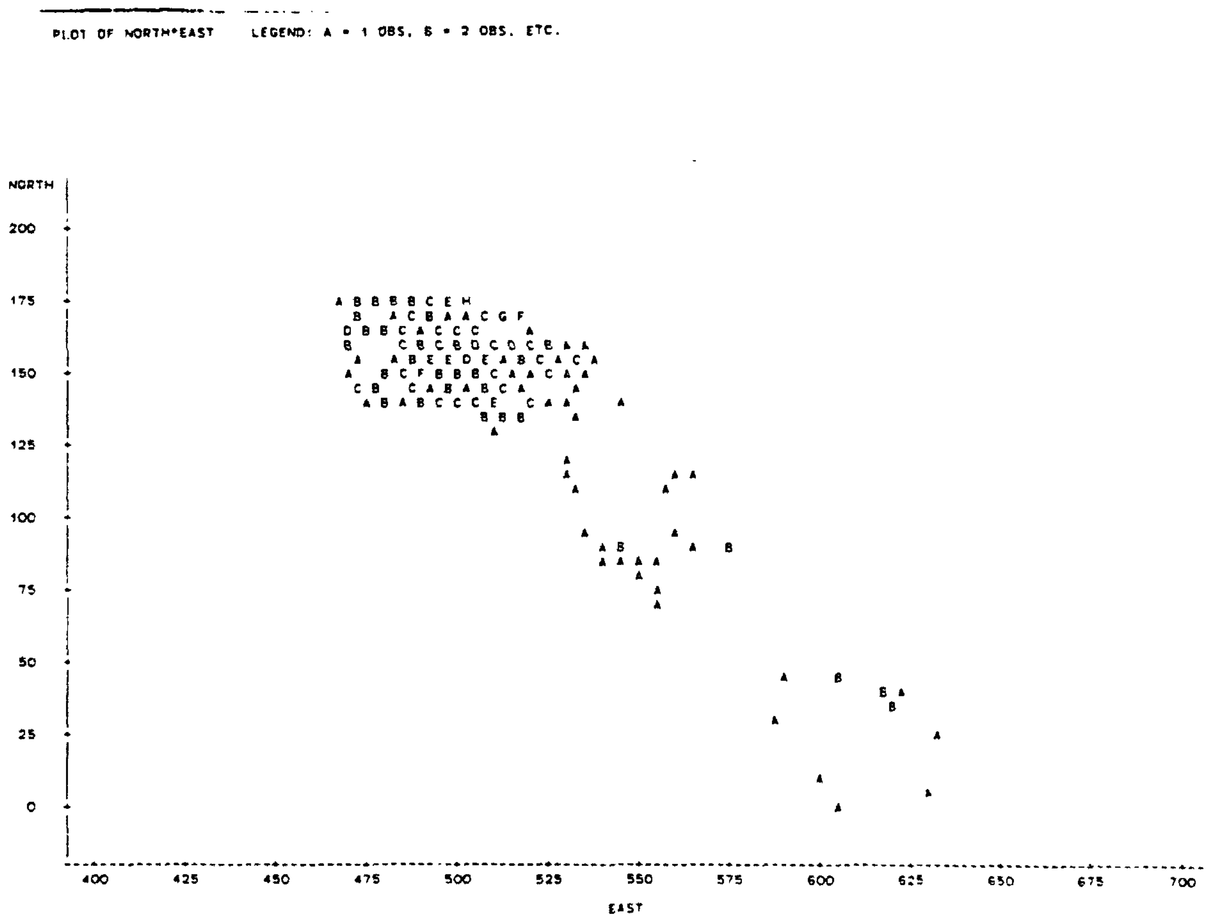


Figure 19. East Block, chipped lithics.

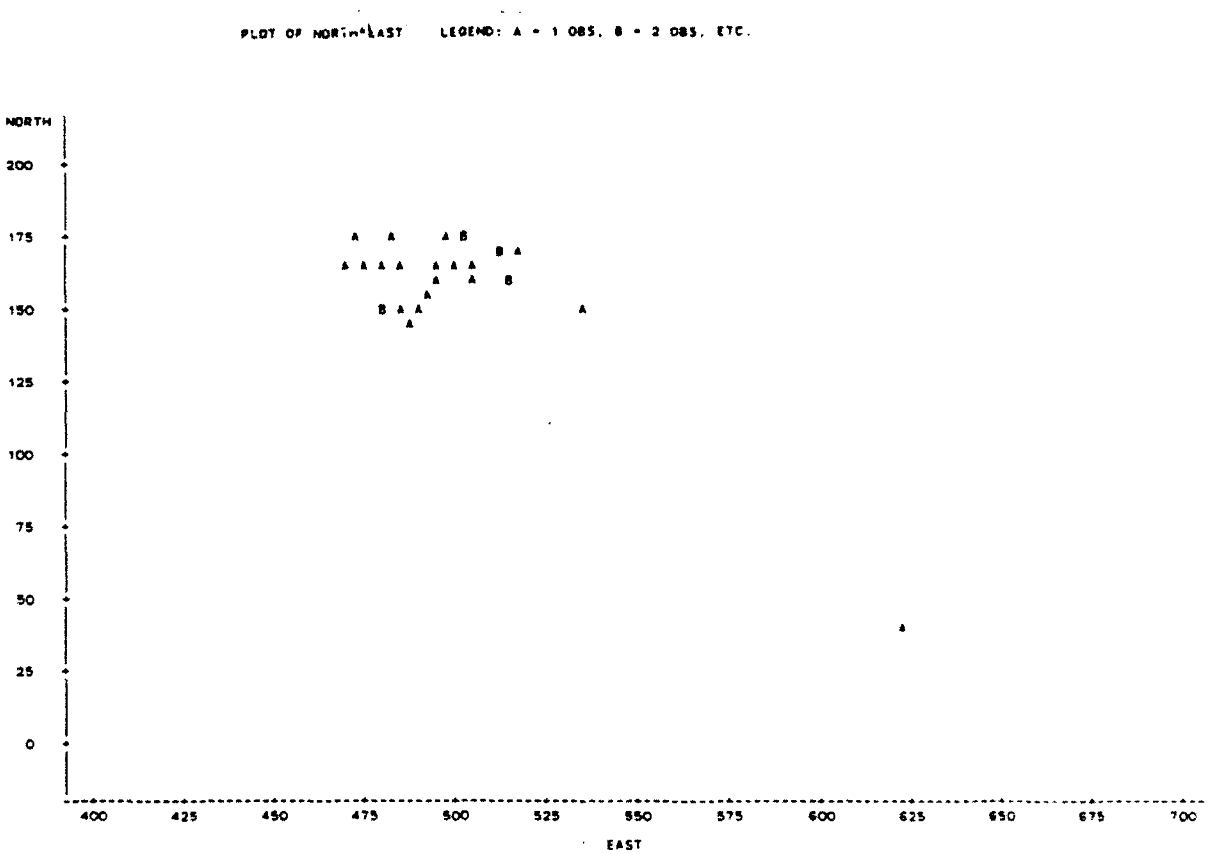


Figure 20. East Block, cores.

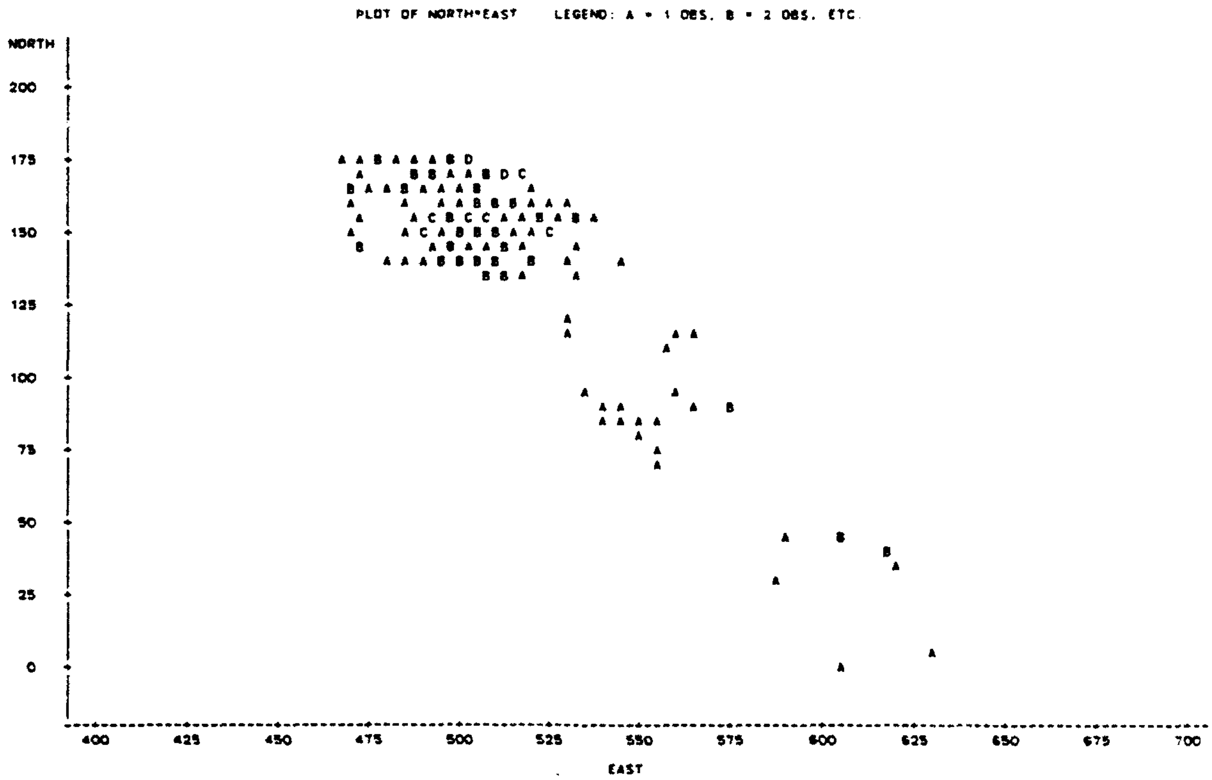


Figure 21. East Block, flakes.

FUNCTIONAL ANALYSIS AND COMPARISONS

Table 22 shows the percentages of different functional types from the 23SO496 CSC. Categories are those defined by Winters (1969), and modified by Stahle (1986) and Lafferty (et al. 1988a, 1988b) for several sites in the Ozarks. Appendix D contains a listing of what tools are included in the analysis. While there are some complications, due to the unevenness of preservation, there is a considerable variability beginning to show up in the different site types. This suggests that the archeological signatures are interpretable whether or not these accurately portray an etic reality for the technologies that produced them. The sites to which comparisons are made used the same categories as in this analysis.

The percentages of different functional categories by count indicates that the overwhelming use of the site was for stoneworking (62%). Stoneworking tools and major byproducts (CORE and BIFK) are even more overwhelming when weights are considered (77%). These percentages are quite similar to 3WA58 where stoneworking tools ranged from 43-76% for different components (Lafferty et al. 1988a:242-243). In contrast is the house excavated at 3NW205 where only 18% of the assemblage was related to stoneworking (Lafferty et al. 1988b:249). The CSC at 3NW205 had 32% stoneworking artifacts by count. From this it is clear that a very, if not most important function of the site was lithic reduction.

A most interesting observation in the lithic reduction carried out at 3WA58 and 23SO496 is the difference in the major production failures. At 3WA58 well over three quarters of the production failures are bifaces, while at 23SO496 almost all of the production failures and rejects are cores. The implication is that the earliest stages of lithic reduction was carried out at the latter site, while at 3WA58 middle and late stages were also being conducted. This conclusion is further supported by the distribution of flake types discussed above. At 23SO496 21% of all flakes were decortication flakes which contrasts with about 5% for 3WA58 (Table 4.9). 3WA58 has 15% more interior flakes than does 23SO496 and a magnitude more softtip flakes which concurs with the large number of early stage bifaces and preforms found there as reduction failures.

From the above, a major procurement strategy can be proposed for 23SO496. Cobbles were obtained from the creek and preliminary reduction was performed by percussion. The purpose was to obtain cores for transportation to locations with no flint and also to produce early stage bifaces, some of which were heat-treated at the site. Others were exported to centers and/or farmsteads, presumably down river in the open stoneless Lower Mississippi Valley. The County Line site (Testler 1988) may be taken as this type of site in a complementary lithic relationship with 23SO496 or other, closer procurement sites on Crowley's Ridge.

The County Line site has a surprisingly high proportion of decortication flakes (28%) however there is a very high proportion of RUM flakes (29%). Also, given the relative sizes of the identifiable flake and core collections (901 23SO496; 662 County Line), we find that County Line has a surprisingly high number (83) and percent (12.5) of cores, compared to 23SO496's 71 cores and 7.88%. From this it is clear that cores were being carried off into the lowlands. The Crowley's Ridge gravel cores at County Line average 12.1 grams while at 23SO496 they average 95.7 grams. It is apparent that cores were being procured on Crowley's Ridge and transported to the lowlands for production of cutting edges and bifaces.

Table 22. Functional Types from 23SO496 by Weights and Counts

ONE WAY FREQ TABLE FOR FUNCTIONAL TYPES WEIGHTED BY WEIGHT

FTYPE	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DOMESTIC	471.2	4.6	471.2	4.6
FABRICATING	261.4	2.6	732.6	7.2
GENERAL UTILITY	1330	13.1	2062.6	20.3
STONEWORKING	7912.4	77.9	9975	98.3
WEAPONS	85.8	0.8	10060.8	99.1
WOODWORKING	82.8	0.8	10143.6	99.9
HISTORIC	8.2	0.1	10151.8	100.0

ONE WAY FREQ TABLE FOR FUNCTIONAL TYPES WEIGHTED BY COUNT

FTYPE	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DOMESTIC	9	6.8	9	6.8
FABRICATING	3	2.3	12	9.1
GENERAL UTILITY	8	6.1	20	15.2
STONEWORKING	82	62.1	102	77.3
WEAPONS	15	11.4	117	88.6
WOODWORKING	13	9.8	130	98.5
HISTORIC	2	1.5	132	100.0

REFERENCES CITED

Adams, Robert M., and Winslow Walker
1942 Archeological Surface Survey of New Madrid County, Missouri. Archeologist 8 (2).

Arkansas Department of Planning
1978 Arkansas Natural Plan. Arkansas Department of Planning, Little Rock.

Bartlett, Charles S., Jr.
1963 Tom's Brook Site - 3JO1: A Preliminary Report. In Arkansas Archeology 1962, edited by C. R. McGimsey III, pp. 15-65. Arkansas Archeological Society, Fayetteville.

Bennett, Jeyne and David A. Higginbotham
1984 Resource Mitigation Along Ditch 19, Site 23DU227, Dunklin County, Missouri. Arkansas Consultants report 84-4. Submitted to the Memphis District, Corps of Engineers, Contract No. DACW-66-83-C-0044.

1964 Carbon 14 dates from the Tom's Brook site, JO1. Newsletter of the Arkansas Archeological Society 5:132-133. Consultants report 84-4. Submitted to the Memphis District, Corps of Engineers, Contract No. DACW-66-83-C-0044.

Binford, Lewis R., Sally R. Binford, Robert Whallon, Margaret Ann Hardin
1970 "Archaeology at Hatchery West." American Antiquity, 35 (4).

Braun, E.L
1950 Forests of Eastern North America. Hafner Press, MacMillan Publishing Company.

Butler, Brian M.
1978 Settlement in the Black Bottom, Pope and Massac Counties, Illinois. Ph.D. Dissertation, Department of Anthropology, Southern Illinois University, Carbondale.

Butler, Brian M., and Ernest E. May
1984 Chert Exploitation--Studies from the Midcontinent. Center for Archeological Investigations, Occasional Papers No.2. Southern Illinois University, Carbondale.

Chapman, Carl H.
1952 Cultural Sequence in the Lower Missouri Valley. In Archeology of the Eastern United States, edited by. J. B. Griffin, pp.139-151. Chicago.

1975 Archeology of Missouri, I. University of Missouri Press, Columbia.

1980 Archeology of Missouri, II. University of Missouri Press, Columbia.

Chapman, Carl H., and Lee O. Anderson
1955 The Campbell Site, a late Mississippi townsite and cemetery in southeast Missouri. The Missouri Archeologist 17(2-3).

Chapman, Carl H., John Cottier, David Denman, David Evans, Dennis Harvey, Michael Ragan, Bradford Rope, Michael Southland, and Gregory Waselkov
1977 Investigation and Comparison of Two Fortified Mississippi Tradition Archeological Sites in Southeastern Missouri: A Preliminary Compilation. Missouri Archeologist No. 38.

Chapman, Jefferson, Paul A. Delcourt, Patricia A. Cridlebaugh, Andrea B. Shea, and Hazel R. Delcourt
1982 Man-Land Interaction: 10,00 Years of American Indian Impact on Native Ecosystems in the Lower Little Tennessee River Valley, Eastern Tennessee. Southeastern Archeology, 1 (2):115-121.

Cottier, John W.
1977a The 1972 Investigations at the Lilbourn Site. The Missouri Archeologist 38:123-154.

1977b Continued Investigations at the Lilbourn Site, 1973. The Missouri Archeologist 38:155-185.

Cottier, John W., and M.D. Southard
1977 An Introduction to the Archeology of Towosahgy State Archeological Site. The Missouri Archeologist 38:230-271.

Dekin, Albert, and Cecil Brooks, Douglas Edsall, James Mueller, Robert Pasnat, Peter Skirbunt, Sally Tompkins, with Charles Lee Decker, James O'Donnell, Vanessa Patrick, Genevier Poirier and Phyllis Morse, Martin Pociask and Bernard Poirier.
1978 Predicting Cultural Resources in the St. Francis Basin, a Research Design. Iroquois Research Institute. Report submitted to the U. S. Army Corps of Engineers.

Delcourt, Paul A., H. R. Delcourt, R. C. Brister and L. E. Lackey
1980 Quaternary Vegetation History of the Mississippi Embayment. Quaternary Research 13:111-132.

Dickson, Don R.
1982 The Albertson site No. 1 (3BE174). Ms. on file, Arkansas Archeological Survey, Fayetteville.

Edrington, Mabel
1962 History of Mississippi County, Arkansas. Ocala Star Banner, Ocala, Florida.

Elvas, Gentleman of
1851 An Account of the Expedition of Captain De Soto's Expedition in the Province of Florida. In The Discovery and Conquest of Terra Florida, by Don Fernando De Soto, and Six Hundred Spaniards His Followers edited by Richard Hakluyt. The Hakluyt Society, London.

Evers, E.
1880 The Ancient Pottery of Southeastern Missouri. In Contribution to the Archaeology of Missouri part 1, pp. 21-30. The Archaeological Section of the St. Louis Academy of Science.

Federal Register
1906 Federal Antiquities Act of 1906. Public Law 59-209; 34 Stat. 225; U.S.C. 431-433.

1960 Reservoir Salvage Act. Public Law 85-523; 74 Stat. 220; 16 U.S.C. 469-469c. June 27.

1966 Historic Preservation Act of 1966. Public Law 89-665; 80 Stat. 915; 16 U.S.C. 470

1969 National Environmental Policy Act of 1969. P.L. 91-190. January 1, 1969, pp. 950-954.

1971 Executive Order 11593. "Protection and Enhancement of the Cultural Environment."

1976 36CFR60 National Register of Historic Places: Nominations by State and Federal Agencies. Rules and Regulations, 9 January 1976.

1979 Public Law 96-95 H.R. 1825]. "Archaeological Resources Protection Act of 1979."

Fehon, Jacqueline R.
1975 Environmental Setting. In The Cache River Archeological Project. Assembled by Michael B. Schiffer and John House. Arkansas Archeological Survey Research Series No. 8.

Fisk, Harold M.
1944 Geological Investigations of the Alluvial Valley of the Lower Mississippi River. Mississippi River Commission Publication No. 52. War Department, U.S. Army Corps of Engineers.

Ford, James A.
1963 Hopewell Culture Burial Mounds Near Helena, Arkansas. Anthropological Papers of the American Museum of Natural History, Vol. 50, Part 1. New York.

Ford, James A., Phillip Phillips and William S. Haag
1955 The Jaketown Site in West-Central Mississippi. Anthropological Papers of the American Museum of Natural History, Vol. 45, Part 1.

Ford, James A., and Gordon R. Willey
1941 An Interpretation of the Prehistory of the Eastern United States. American Anthropologist 43 (3):325-363.

Fowke, Gerard
1910 Antiquities of Central and Southeast Missouri. Bureau of American Ethnology, Bulletin No. 37. Washington.

Futato, Eugene M.
1983 "A Beginning Artifact Geometry," Archeological Investigations in tne Cedar Creek and Upper Bear Creek Reservoirs.

Gilmore, Michael
1979 An Archeological Survey of Mingo National Wildlife Refuge:1978. Submitted to the Fish and Wildlife Service, Dept. of Interior, Washington. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-128.

Greer, John W. (Assembler)
1978 Cultural Resources Study of the P62 Products Line across southeast Missouri. Archeological Services Survey Report No. 2, Columbia, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-73.

Gregory, Waselkov
1977 Investigation and Comparison of Two Fortified Mississippi Tradition Archeological Sites in Southeast Missouri: A Preliminary Compilation. Missouri Archeologist No. 38.

Goodyear, Albert C.
1974 The Brand Site: A Techno-functional Study of a Dalton Site in Northeast Arkansas. Arkansas Archeological Survey Research Series 7. Fayetteville.

Griffin, James B.
1952 Prehistoric Cultures of the Central Mississippi Valley. In Archeology of Eastern United States, edited by J. B. Griffin, pp. 226-238. Chicago.

Guccione, Margaret J.
1987 Geomorphology, Sedimentation, and Chronology of Alluvial Deposits, Northern Mississippi County, Arkansas. In A Cultural Resources Survey, Testing, and Geomorphic Examination of Ditches 10, 12, and 29, Mississippi County, Arkansas by Lafferty et al., pp. 67-98. Mid-Continental Research Associates Report 86-5. Submitted to the Memphis District Corps of Engineers, Contract No. DACW66-86-C-0034.

Guccione, Margaret J., Robert H. Lafferty and Linda Scott Cummings
1988 Environmental Constraints in Human Settlement in an Evolving Holocene Alluvial System, the Lower Mississippi Valley. Geoarchaeology: An International Journal, 3 (1):65-84. John Wiley and Sons, Inc.

Gurley, Phill D.
1979 Soil Survey of Dunklin County, Missouri. U>S> Department of Agriculture, Soil Conservation Service, Washington.

Harlow, William M., and Ellwood S. Harrar
1968 Textbook of Dendrology. McGraw Hill Book Company, New York.

Harris, Suzanne E.

1977 Survey for Archaeological, Architectural and Historic Resources Along Ditch 19, Item 1, Parcel 1, Dunklin County, Missouri. American Archaeology Division. University of Missouri, Columbia.

1980 Reconstruction of the 19th century Environment. In Zebree Archeological Project, edited by Dan F. and Phyllis A. Morse, pp. 13:1-14. Ms. on file, U. S. Army Corps of Engineers, Memphis.

Hawker, Jon L.

1987 Missouri Natural Communities. A Natural History of the Crossroads State. Merimac Community College, St. Louis.

Hemmings, E. Thomas and John H. House

1985 The Alexander Site. Arkansas Archeological Survey Research Series, No. 24, Fayetteville.

Hemmings, E. Thomas

1982 Human Adaptation in the Grand Marais Lowland. Arkansas Archeological Survey, Research Series No. 17.

Hernandez de Biedma, Luis

1851 A Relation of What Took Place During the Expedition of Captain Soto: With Particulars Concerning the Nature of the Country Through Which he Passed. In The Discovery and Conquest of Terra Florida, by Don Fernando De Soto, and Six Hundred Spaniards His Followers, edited by Richard Hakluyt. The Hakluyt Society, London.

Holmes, William H.

1903 Aboriginal Pottery of the Eastern United States. Twentieth Annual Report, Bureau of American Ethnology. Washington, D. C.

Hopgood, James F.

1969 An Archeological Reconnaissance of Portage Open Bay in southeast Missouri. Missouri Archeological Society Memoir No. 7. Columbia.

House, John H.

1982 Powell Canal: Baytown Period Occupation On Bayou Macon In Southeast Arkansas. Arkansas Archeological Survey Research Series 19. Fayetteville.

Hudson, Charles

1984 The Route of De Soto Through Arkansas. Paper presented at the Department of Anthropology Colloquium, University of Arkansas, Fayetteville.

1985 De Soto in Arkansas: A Brief Synopsis. In Field Notes. Arkansas Archeological Society Number 205, July/August. Fayetteville.

Iroquois Research Institute

1978 A Survey Level Report of the Castor River Ditch Enlargement Project, Item 1, Stoddard County, Missouri. Submitted to the U.S. Army Corps of Engineers, Memphis District by I.R.I. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-213.

Johnson, Jay K.
1981 Lithic Procurement and Utilization Trajectories: Analysis, Yellow Creek Nuclear Power Site, Tishomingo County, Mississippi, Volume II. Tennessee Valley Authority Publications in Anthropology, Number 28.

Kay, Marvin (editor)
1980 Holocene Adaptations within the lower Pomme de Terre River Valley, Missouri. ISM Society, Springfield, Illinois. Submitted to U. S. Army Corps of Engineers, Kansas City. Contract No. DACW41-76-C-0011.

Kay, Marvin, Francis B. King and C.K. Robinson
1980 Cucurbits from Phillips Spring: New Evidence and Interpretations. American Antiquity 45:806-822.

Keller, John E.
1983 Cultural Resources Survey and Literature Review of Belle Fountain Ditch and Tributaries, Dunklin and Pemiscot Counties, Missouri, and Mississippi County, Arkansas. New World Research, Inc. Report of Investigations No. 92.

King, James E.
1980 Palynological Studies of Big Lake Arkansas. In Zebree Archeological Project edited by Dan F. Morse and Phyllis A. Morse, Chapter 14. Report submitted to U. S. Army Corps of Engineers by the Arkansas Archeological Survey.

King, James E. and William H. Allen, Jr.
1977 A Holocene Vegetation Record from the Mississippi River Valley, Southeastern Missouri. Quaternary Research 8:307-323.

Klinger, Timothy C.
1982 Mangrum Arkansas Archeological Survey Research Series, No. 20. Fayetteville.

Klinger, Timothy C., and Mark A. Mathis (assemblers)
1978 St. Francis II. Arkansas Archeological Survey Research Report 14, Fayetteville.

Klinger, Timothy C., Carol S. Spears, Ross A. Dinwiddie,
Michael C. Sierzchula, Cynthia R. Price and James E. Price
1981 Cultural Resources Survey and Testing in the Bootheel Region of Missouri. Historic Preservation Associates. Submitted to the U. S. Army Corps of Engineers, Memphis District, Contract No. DACW66-81-C-0032.

Krakker, James J.
1977 Archeological Survey in Mingo National Wildlife Refuge: an Investigation of Changing Adaptations in the Ozark Border. Submitted to the U. S. Fish and Wildlife Service, Mingo National Wildlife Refuge, Puxico, Missouri.

Kuchler, A. W.
1964 Potential Natural Vegetation of the United States. American Geographical Society, New York.

Lafferty, Robert H., III

1973 An Analysis of Prehistoric Southeastern Fortifications. Masters thesis, Southern Illinois University, Carbondale.

1977 The Evolution of the Mississippian Settlement Pattern and Exploitative Technology in the Black Bottom of Southern Illinois. Ph.D. dissertation, Department of Anthropology, Southern Illinois University, Carbondale.

1981 The Phipps Bend Archeological Project Office of Archeological Research, Research Series No. 4 University of Alabama and T.V.A. Publications in Anthropology, No. 26, Chattanooga, Tennessee.

1984 Lithic Resources Exploitation and Use in the Felsenthal Uplands. In Final Report of Final Phase II Survey and Phase III Site Evaluation, Sparta Mine Area, edited by Robert H. Lafferty III and John H. House. Submitted to Shell Oil Company, Houston Texas, by the Arkansas Archeological Survey, Project No. 517.

1986 A Review of Ethnohistoric and Archeological Evidence of Riverine Canoe Facilities of the Eastern United States. Paper presented at the 51st Annual Meeting of the Society for American Archeology, New Orleans.

1989 Data Recovery by Controlled Surface Collection, 23SO496, Stoddard County, Missouri. MCRA Report under preparation.

Lafferty, Robert H., III, L. G. Santeford, Phyllis. A. S. Morse, and L. M. Chapman

1984 A Cultural Resources Survey and Evaluation in the Tyronza River Watershed Phase I Area, Mississippi County, Arkansas. MCRA No. 84-2,. Submitted to USDA, Soil Conservation Service, Little Rock, Contract No. 54-7103-3-290.

Lafferty, Robert H. III, Carol S> Spears, and Michael C. Sierzchula

1985 National Register of Historic Places Significance Testing at Six Sites (23SO: 459, 465, 471, 496, 497, and 500) in the Castor River Enlargement Project, Stoddard County, Missouri. Report submitted to Memphis District, Corps of Engineers.

Lafferty, Robert H., III, Lawrence G. Santeford, Carol S. Spears, Neal H. Lopinot, Sharon A. Lopinot, Michael C. Sierzchula and Kathleen M. Hess

1986 Cultural Resources Data Recovery in Basins 14, 15, 20 and 21 of the Fourche Creek Watershed, Randolph County, Arkansas. MCRA Report No. 85-5. Submitted to the SCS, Contract No. 53-7103-5-402.

Lafferty, Robert H., III and Michael C. Sierzchula

1987 A Cultural Resources Literature Search, Record Review, and Cultural Resources Survey of the Belle Fountain Ditch Enlargement Project within Poinsett and Dunklin Counties, Missouri. MCRA Report No. 86-2. Submitted to Memphis District Corps of Engineers, Contract No. DACW66-86-M-0538.

Lafferty, Robert H. III, Margaret J. Guccione, Linda J. Scott, D. Kate Aasen, Beverly J. Watkins, Michael C. Sierzchula, and Paul F. Baumann

1987 A Cultural Resources Survey, Testing and Geomorphic Examination of Ditches 10, 12, and 29, Mississippi County, Arkansas. Mid-

Continental Research Associates Report 86-5. Memphis District Corps of Engineers, Contract No. DACW66-86-C-0034.

Lafferty, Robert H. III and Lawrence G Santeford, Margaret C. Guccione, Michael C. Sierzchula, Neal
1988a The Mitchell Site: 3WA58. Archeological Investigations at a Prehistoric Open-Field Site in Washington County, Arkansas. Prepared for the City of Fayetteville.

1988b Tracks in Time. Archeology at the Elk Tract Site (3NW205) and the Webb Branch Site (3NW206), Erbie Campground Project, Buffalo National River, Newton County, Arkansas. Submitted to National Park Service, Southwest Region.

Lafferty, Robert H. III and Robert F. Cande
1989 Cultural Resources Investigations Peacekeeper Rail Garrison Program Eaker Air Force Base, Mississippi County, Arkansas. Mid-Continental Research Associates Report 88-5. Prepared for U.S. Air Force Regional Civil Engineer AFRCE-BMS, Norton Air Force Base, California under subcontract to Tetra Tech, Inc. San Bernardino. Prime contract No. FO4704-85-C-0062.

LeeDecker, Charles H.
1979 A Survey Level Report of the Ditch 24 enlargement project. Submitted to U. S. Army Corps of Engineers, Memphis District by Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-129.

1980a A survey level report of the Upper Buffalo Creek Ditch enlargement project Dunklin County, Missouri, Mississippi County, Arkansas. Iroquois Research Institute. Prepared for U.S. Corps of Engineers Memphis District, Contract No. DACW-66-78-C-0054.

1980b A survey level report of the Caruthersville Harbor Project, Pemiscot County, Missouri. Archaeology, History, and Architecture. LeeDecker and Associates, Springfield, Virginia. Prepared for U.S. Corps of Engineers Memphis District. Contract No. DACW-66-80-M-1743R.

Lewarch, Dennis E. and Michael J. O'Brien
1981 The Expanding Role of Surface Assemblages in Archaeological Research. In Advances in Archaeological Method and Theory Vol. 4, edited by Michael B. Schiffer, pp. 297-342. Academic Press, New York.

Lewis, R. Barry
1974 Mississippian Exploitative Strategies: A Southeast Missouri Example. Missouri Archaeological Society, Research Series No. 11.

Logan W. D.
1952 Graham Cave: An Archaic Site in Montgomery County Missouri Memoir, Missouri Archeological Society, No. 2.

Lumb, Lisa Cutts and Charles H. McNutt
1988 Chucalissa: Excavations in Units 2 and 6, 1959-67. Memphis State University Anthropological Research Center Occasional Papers No. 15.

Marquette, Jacques
1954 Jesuit Relations, edited by Edna Kenton. Vanguard Press, New York.

Marshall, Richard A.
1965 An Archeological Investigation of Interstate Route 55 through New Madrid and Pemiscot Counties Missouri, 1964. University of Missouri, Highway Archeological Report, No. 1, Columbia.

McMillan, R. Bruce
1971 Biophysical Change and Cultural Adaptation at Rogers Shelter, Missouri. Ph.D. dissertation, University of Colorado, Denver.

McNeil, Jimmy D.
1982 A Cultural Resources Survey of the Ditch 75, Blytheville Air Force Base, Mississippi County, Arkansas. U.S. Army Corps of Engineers, Memphis District.

1984 A Cultural Resources Survey in the Mingo Ditch Scour Repair Project. Prepared by the U. S. Army Corps of Engineers, Memphis District. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-360.

Medford, Larry
1972 Site Destruction Due to Agricultural Practices in Northeast Arkansas. Arkansas Archeological Survey Research Series No. 3. Fayetteville.

Moore, Clarence B.
1910 Antiquities of the St. Francis, White and Black Rivers, Arkansas. Journal of the Academy of Natural Sciences of Philadelphia 14:255-364.

1916 Additional Investigations on the Mississippi River. Journal of the Academy of Natural Sciences of Philadelphia 16:492-508.

Monastersky
1989 Hills Point to Catastrophic Ice Age Floods. Science News.

Morse, Dan F.
1973 Nodena. Arkansas Archeological Survey Research Series No. 4. Fayetteville.

1974 Armorel Lithics. In Field Notes September-October 1974. Arkansas Archeological Society.

1976 An Analysis of the Dalton Complex in the Central Mississippi Valley. In IX Congress, Union International des Sciences Prehistoriques et Proto-historiques, Colloque XVII, Habitates Humains Anterieurs a L'Holocene en Amerique: 136-166

1982a Northeast Arkansas. In A State Plan for the Conservation of Archeological Resources in Arkansas, edited by H. A. Davis. Arkansas Archeological Survey Research Series No. 21. Fayetteville.

1982b Regional Overview of Northeast Arkansas. In Arkansas Archeology in Review edited by Neal L. Trubowitz and Marvin D. Jeter, pp.20-36. Arkansas Archeological Survey Research Series No. 15. Fayetteville.

Morse, Dan F. and Phyllis A. Morse

1983 Archaeology of the Central Mississippi Valley. Academic Press, New York.

Morse, Dan F. and Phyllis A. Morse (editors)

1980 Zebree Archeological Project. Arkansas Archeological Survey, Fayetteville. Submitted to Memphis District, U. S. Corps of Engineers.

Morse, Phyllis A.

1979 An archeological survey of portions of the Big Lake National Wildlife Refuge. Arkansas Archeological Survey. Submitted to Heritage Conservation and Recreation Service, IAS, Atlanta.

1981 Parkin. Arkansas Archeological Survey Research Series No. 13. Fayetteville.

Moselage, John H.

1962 The Lawhorn Site. Missouri Archaeologist 24.

Muller, Jon D.

1978 The Kincaid System: Mississippian Settlement in the Environs of a Large Site. In Mississippian Settlement Patterns, edited by Bruce D. Smith, pp. 269-292. Academic Press, New York.

Ranjel, Rodrigo

1922 A narrative of De Soto's Expedition based on the Diary of Rodrigo Ranjel, his private secretary. In Narratives of the Career of Hernando De Soto, edited by Edward G. Bourne Vol. II. Allerton Book Company, New York.

Perino, Gregory

1985 Selected Preforms, Points and Knives of the North American Indians: Volume 1. Points and Barbs Press, Idabel, Oklahoma.

Phillips, Philip

1970 Archaeological Survey in the Lower Yazoo Basin Mississippi 1949-1955. Papers of the Peabody Museum, Harvard University 60.

Phillips, Philip, James Ford and James B. Griffin

1951 Archaeological Survey in the Lower Mississippi Alluvial Valley. 1940-1947. Papers of the Peabody Museum, Harvard University 25.

Potter, William B.

1880 Archeological Remains in Southeast Missouri. Contributions to the Archeology of Missouri, Part 1, pp. 1-20. Salem, Massachusetts.

Price, Cynthia R.

1976 A Cultural Resources Assessment of Six USDA Service Exchange Tracts: The Foerster and White Exchanges, Mark Twain National

Forest. Submitted to USDA Forest Service, Rolla, Missouri.

1979 A Cultural Resources Survey of Areas to be Disturbed by Proposed Modifications to the existing Wastewater Treatment Facility, Moorehouse, New Madrid County, Missouri: 1979. Center for Archeological Research, Report No. 199. Springfield.

1980 Archeological Investigations at Prehistoric Sites 23OR42 (Riverton), 23OR60 (Turtle Island Spring), and 23OR59 (Rush Creek Camp) in the Eleven Point Valley, Oregon County, Missouri: 1979. Submitted to USDA Forest Service, Mark Twain National Forest Rolla.

Price, James E.

1973 Settlement Planning and Artifact Distribution on the Snodgrass Site and their Socio-political Implications in the Powers Phase of Southeast Missouri. Ph.D. Dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

1976a An Archeological Survey of Houck Park, Puxico, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-17.

1976b An Archeological Survey of Boone Park, Dexter, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-21.

1978 An Archeological Survey of the Proposed Sewer System, Puxico, Stoddard County, Missouri. Report on file, Divisions of Parks and Recreation, Department of Natural Resources, Jefferson City, Missouri. Report No. AR-VB-104.

1980 Archaeological Investigations at 23DU244, a limited activity Barnes site, in the City of Kennett, Dunklin County, Missouri. Center for Archaeological Research, Southwest Missouri State University, Springfield.

Price, James E. and Cynthia R. Price

1980 A predictive model of archaeological site frequency for informed management of the resources within the proposed New Madrid, Pemiscot, and Dunklin Counties, Missouri 1979 Center for Archaeological Research, Southwest Missouri State University, Springfield.

1981 Changing Settlement Systems in the Fourche Creek Watershed in the Ozark Border Region of Southwest Missouri and Northeast Arkansas. Southwest Missouri State University, Center for Archeological Research, Report No. 251.

1984 Phase II Testing of the Shell Lake Site, 23WE-627, Near Wappapello Dam, Wayne County, Missouri, 1984. St Louis District, Cultural Resources Management Report No. 11. U.S. Army Corps of Engineers, St. Louis District.

Price, James E., and James J. Krakker
1975 Dalton Occupation of the Ozark Border. Museum Brief No. 20. Museum of Anthropology, University of Missouri, Columbia.

Price, James E., Cynthia R. Price, J. Cottier, S. Harris and J. House
1975 An Assessment of the Cultural Resources of the Little Black Watershed. University of Missouri, Columbia.

Price, James E., Lynn D. Morrow and Cynthia R. Price
1978 A Preliminary Literature Review of the Prehistoric and Historic Cultural Resources for the M & A Power Corporation Power Line Transect in New Madrid, Dunklin and Pemiscot Counties, Missouri, and Mississippi County, Arkansas: 1979. Center for Archeological Research, Southwest Missouri State University, Springfield.

Price, James E., and James B. Griffin
1979 The Snodgrass Site of the Powers Phase of Southeast Missouri. Anthropological Papers, Museum of Anthropology, University of Michigan 66.

Raisz, Erwin
1978 Physiography in Goode's World Atlas, edited by Edward B. Espenshade. Rand and McNally.

Redfield, Alden
1971 Dalton project notes, volume one. Museum Brief 13. Museum of Anthropology, University of Missouri, Columbia.

Redman, Charles L
1987 Surface Collection, Sampling, and Research Design: A Retrospective. American Antiquity 35:279-291.

Redman, Charles L., and Patty Jo Watson
1970 Systematic, Intensive Surface Collection. American Antiquity 35:279-290.

Redman, Charles L., Ronald D. Anzalone, Patricia E. Rubertone
1979 Medieval Archaeology at Qsar es-Seghir, Morocco. Journal of Field Archaeology, Vol 6:1-16.

Rolingson, Martha A. (editor)
1984 Emerging Patterns of Plum Bayou Culture. Arkansas Archeological Survey, Research Series No. 18. Fayetteville.

Roper, Donna C.
1976 Lateral Displacement of Artifacts Due to Plowing. American Antiquity 41:372-374.

Sabo. George, III, David B Waddell, and J. H. House
1982 A Cultural Resources Overview of the Ozark-St. Francis National Forests, Arkansas. Arkansas Archeological Survey, Fayetteville. Submitted to and published by USDA-Forest Service, Ozark-St. Francis Forests, Russelville, Contract No.53-43ZP-1-00984.

Santeford, Lawrence G.

1982 Archeological Testing within the Keo-Independence-Dell 500 Kilovolt Power Line Corridor. Arkansas Archeological Survey project 508. Submitted to Arkansas Power and Light Company, Little Rock.

1988a "Use-wear Analysis of a Sample of Stone Artifacts from 3NW205," Tracks in Time: Archeology at the Elk Tract Site (3NW205) and the Webb Branch Site (3NW206), Erbie Campground Project, Buffalo National River, Newton County, Arkansas. Submitted to National Park Service, Southwest Region.

1988b "Use-wear of Stone Artifacts from 3WA58," The Mitchell Site: 3WA58. Archeological Investigations at a Prehistoric Open-Field Site in Washington County, Arkansas. Prepared for the City of Fayetteville.

Sartain, Elliot B.

n.d. It Didn't Just Happen Little Grassey and Drainage District No. 9, Osceola.

Saucier, Roger T.

1964 Geological Investigations of the St. Francis Basin. U.S. Army Corps of Engineers, Waterways Experiment Station Technical Report 3-659.

1968 A New Chronology for Braided Stream Surface Formation in the Lower Mississippi Valley. South-eastern Geology 9:65-76.

1970 Origin of the St. Francis Sunk Lands, Arkansas and Missouri. Geological Society of America Bulletin 81:2847-2854.

1974 Quaternary Geology of the Lower Mississippi River Valley. Arkansas Archeological Survey Research Series No. 6, Fayetteville.

1980 Current Thinking on Riverine Processes and Geologic History as Related to Human Settlement in the Southeast. Geoscience and Man XXII:7-18.

Shaw, David D.

1981 Lithic Procurement Models for Western Lowlands In The AP&L Keo to Dell 500 Kilovolt Transmission Line Archeological Surveys by Robert H. Lafferty III, D.D. Shaw, T.J. Padgett, N.L. Trubowitz, D.D. Jurney, S. Imhoff and J. T. Toney. Report on file Arkansas Archeological Survey, Fayetteville. Project No. 470.

Shelford, Victor E.

1963 The Ecology of North America. University of Illinois Press, Urbana.

Sierzchula, Michael, and Robert H. Lafferty III

1986 An Archeological Survey of Nine Areas within the Western Clay County Regional Water Distribution District Clay and Randolph Counties, Arkansas. Mid-Continental Research Associates report 86-4. Report submitted to Mulhollen and Associates, Inc., Jonesboro, Arkansas.

Sjoberg, Alf

1976 Cultural Resources Survey of Areas for Proposed Water System

Improvements for the City of Tallapoosa, Missouri. American Archeology Division, University of Missouri, Columbia.

Smith, Bruce D.
1978 Prehistoric Patterns of Human Behavior. Academic Press, New York.

Smith, E.N., Jr.
1984 Late-Quaternary Vegetational History at Cupola Pond, Ozark National Scenic Riverways, Southeastern Missouri. Master's thesis, University of Tennessee, Knoxville.

Spears, Carol S.
1978 The Derossitt Site (3SF49): Applications of Behavioral Archeology to a Museum Collection Master's thesis, Department of Anthropology, University of Arkansas.

Spears, Carol S., Robert A. Taylor, John C. Dixon, Phyllis A. Morse, and Michael G. Million
n.d. Archeological survey, initial site testing and geomorphic study of Ditches 7, 13, and lower Buffalo Creek in Craighead, Mississippi, and Poinsett Counties, Arkansas. Draft report in progress for the Army Corps of Engineer, Memphis District Contract No. DACW66-86-C-0072.

Stahle, Vincas P.
1986 Prehistoric Archaeology in the Southeastern United States, 1970-1985. Annual Review of Anthropology

Taylor, Walter W.
1948 A Study of Archeology Memoirs of the American Anthropological Association, No. 69.

Teltser, Patrice
1988 The Mississippian Archaeological Record on the Malden Plain, Southeast Missouri: Local Variability in Evolutionary Perspective. Ph.D. dissertation. University Microfilms International, Ann Arbor.

Thomas, Cyrus
1894 Report on the Mound Explorations of the Bureau of Ethnology. Bureau of American Ethnology 12th Annual Report.

Thomas, Ronald A.
1969 Breckenridge: A Stratified Shelter in Northwest Arkansas. Masters thesis, Department of Anthropology, University of Arkansas, Fayetteville.

Varner, John and Jeanette Varner (translators)
1951 The Florida of the Inca by Garcilaso de la Vega. University of Texas Press, Austin.

Waddell, David B., John House, Francis B. King, Mona L. Colburn, and Murray K. Marks
1987 Results of Final Testing for Significance at the Ink Bayou Site (3PU252), Pulaski County, Arkansas. Arkansas Archeological Survey, Fayetteville. Submitted to Arkansas

Highway and Transportation Department.

Wadleigh, Linda and Kevin W. Thompson
1989 Proton Magnetometer Survey of Site 3MS105, Blytheville Air Force Base. Western Wyoming College. Submitted to Tetra Tech Inc., San Bernardino.

Walker, W. M., and R. M. Adams
1946 Excavations in the Mathews Site, New Madrid County Missouri. Transactions of the Academy of Science of St. Louis 31(4):75-120.

Ward, T.
1965 Correlation of Mississippian Sites and Soil Type. The Southeastern Archaeological Conference, Proceedings of the 21st Southeastern Archaeological Conference, Bulletin No. 3:42-48.

Webb, Clarence H.
1968 The Extent and Content of the Poverty Point Culture. American Antiquity 33:297-321.

Weichman, Michael S.
1978 Guidelines for Contract Cultural Resources Survey Reports and Professional Qualifications. Department of Natural History, Office of Historic Preservation, Jefferson City, Missouri.

1979 Guidelines for Reporting Phase II Testing of Archeological Site Significance and Evaluation of National Register Eligibility. Department of Natural History, Office of Historic Preservation, Jefferson City, Missouri.

Weston, Donald E. and Michael S. Weichman
1987 Master Plan for Archaeological Resource Protection in Missouri.

Willey, Gordon R., and Philip Phillips
1958 Method and Theory in American Archeology University of Chicago Press, Chicago.

Williams, J. Raymond
1964 A Study of Fortified Indian Villages in Southeast Missouri. Master's thesis, Department of Anthropology, University of Missouri, Columbia.

1968 Southeast Missouri Land Leveling Salvage Archeology, 1967. The Department of Anthropology, University of Missouri, Columbia. Submitted to National Park Service, Midwest Region, Lincoln, Nebraska.

1974 The Baytown Phases in the Cairo lowland of Southeast Missouri. The Missouri Archeologist 36.

Williams, Stephen
1954 An Archeological Study of the Mississippian Culture in Southeast Missouri. Unpublished Ph.D. Dissertation, Department of Anthropology, Yale University.

Winters, Howard D.
1969 The Riverton Culture, A Second Millennium Occupation in the Central Wabash Valley. Published jointly by the Illinois Archaeological Survey and the Illinois State Museum.

Wood, W. Raymond
1963 Breckenridge Shelter -- 3CR2: An Archeological Chronicle in the Beaver Reservoir area. In Arkansas Archeology 1962, edited by C. R. McGimsey III, pp. 67-96. Arkansas Archeological Society, Fayetteville.

Wright, Christopher A.
1987 Study Units. In Master Plan for Archaeological Resource Protection in Missouri, edited by Donald E. Weston and Michael S. Weichman, pp. B-i-2.

APPENDIX A

DELOS ACRONYM LIST

APPENDIX A

DELOS ACRONYM LIST

FIELD1
MAJOR ARTIFACT CLASS

ANIM	ANIMAL
PERS	PERSONAL
CG	CHIPED AND GROUND
CL	CHIPPED LITHIC
FLOR	FLORAL
HUM	HUMAN REMAINS
DOM	DOMESTIC
GRL	GROUND LITHIC
OHIST	OTHER HISTORIC
POT	POTTERY
SHELL	SHELL
URM	UNMODIFIED RAW MATERIAL
STRUCT	STRUCTURAL
CRAFT	CRAFT
SYN	SYNTHETIC
FOSSIL	FOSSIL

****

FIELD2
SPECIFIC MORPHOLOGICAL

BLADE	BLADE
CHNK	CHUNK
COBL	COBBLE
COBTO	COBBLE TOOL
CORE	CORE
CRYS	CRYSTAL
DISCOID	DISCOIDAL
FLA	FLAKE
GEOB	GEOMETRIC OBJECT
MISC	MISCELLANEOUS OBJECT
PEBL	PEBBLE
SHAT	SHATTER
UNIF	UNIFACE
XLTO	CRYSTAL TOOL
CONC	CONCRETION
GRAV	GRAVEL
APLQ	APPLIQUE
BAKBL	BAKING BALL
BALL	BALL/SPHEROID
BASE	BASAL SHERD
BEAD	BEAD
BODY	BODY SHERD
BODYFG	BODY SHERD FRAGMENT
CYLND	CYLINDER
DAUB	DAUB

FIELD 2 CONTINUED

DEB	DEBRIS
DISK	DISK
EARPLG	EARPLUG
EARS	EARSPOOL
HCLAY	HEARTH CLAY
MDLOBJ	MODELED OBJECT
MDN	MUD DAUBERS NEST
PEL	PELLET
PODAL	PODAL
RIM	RIM SHERD
RIMFG	RIM SHERD FRAGMENT
RMBDY	RIM AND BODY SHERD
RMLUG	RIM LUG
BDBASE	BODY AND BASE SHERD
SQBASE	SQUARE BASE
BIFK	BIFACE/KNIFE
PEBTO	PEBBLE TOOL
DEBIT	DEBITAGE
FCLAY	FIRED CLAY
ADORN	ADORNMENT
CLOTH	CLOTHING
INDULG	INDULGENCES
PASTREC	PASTTIMES AND RECREATION
MAINREP	MAINTENANCE AND REPAIR
FOODPREP	PREPARATION AND CONSUMPTION OF FOOD
HOUSE	HOUSING
STORE	STORAGE FACILITY
HEARTH	HEARTH
GROOM	BODY GROOMING
FOOTWEAR	FOOTWEAR
MED	MEDICAL AND HEALTH
COMP	COMPONENTS
HARDW	HARDWARE
CRAFT	XXXXXXXXXXX
SUBS	SUBSISTENCE
COMMTRANS	COMMERCE AND TRANSPORTATION
SKILL	SKILLS OR CRAFTS
FURNISH	FURNISHINGS
PTLID	POTLID
POTCOL	POTTERY COIL
BDYHND	BODY SHERD W/HANDLE AREA
RIMHND	RIM SHERD WITH HANDDLE
RIMHND	RIM SHERD WITH HANDLE
RIMHNDL	RIM SHERD WITH HANDLE
PPK	PROJECTILE POINT/KNIFE
PREFORM	PREFORM
VES	VESSEL
RMEFG	RIM EFFIGY
BODYLUG	BODY LUG
SHDISK	SHERD DISK
BRIM	BOTTLE RIM
BURNST	BURNISHING STONE
CHIP	CHIP

****

FIELD3
MORPHOFUNCTIONAL

ABRAD	ABRADER
ADZE	ADZE
ARROW	ARROW POINT
AWL	AWL
AXE	AXE
IND	INDETERMINATE
BURIN	BURIN
CELT	CELT
CHOP	CHOPPER
DART	DART POINT
DRAW	DRAWSHAVE
DRAWL	DRILL/AWL
GRAVE	GRAVER
HAM	HAMMERSTONE
HOE	HOE
KNIFE	KNIFE
MANO	MANO
METATE	METATE
MORTAR	MORTAR
PERF	PERFORATOR
PREFORM	preform
PERG	PERFORATOR/ENGRAVER
PEST	PESTLE
SIDE	SIDE SCRAPER
SPEAR	SPEAR POINT
SPOKS	SPOKESHAVE
ST1	STAGE 1
ST2	STAGE 2
ST3	STAGE 3
EXQUIL	PIECE ESQUILLEE
PAB	PEBBLE ABRADER
PPK	PROJECTILE POINT/KNIFE
GRIP	grinding/pounding tool
PITS	PITTED STONE
PIPE	PIPE
PLUM	PLUMMET
PPO	POVERTY POINT OBJECT
CHAA	CELT/HOE/ADZE/AXE
SCR	SCRAPER
DRIP	DRILL/PERFORATOR
END	END SCRAPER
CIRC	CIRCULAR
DRILL	DRILL
DENT	DENTICULATE
ARPFRM	ARROW PREFORM
UPIT	U-PITTED STONE
VPIT	V-PITTED STONE
PITPIT	IND PIT FLIP IND PIT
VPUP	V-PIT FLIP U-PIT
UPUP	U-PIT FLIP U-PIT

FIELD 3 CONTINUED

VPVP	V-PIT FLIP V-PIT
POUND	POUNDING TOOL
GRIND	GRINDING TOOL
RING	ring
STRAPEND	STRAP END FOR SINGLETREE
HAMETIP	TIP ON WOOD HAME
AMMO	AMMUNITION
SHOE	SHOE PART
TKNIFE	TABLE KNIFE
COMB	COMB
KNITND	KNITTING NEEDLE
TAC	TAC
PLUG	PLUG
TILE	TILE
TOY	TOY
CANOP	CAN OPENER
FLWRPOT	FLOWER POT
FISHLUR	FISHING LURE
MACHBOLT	MACHINE BOLT
GIZSTON	GIZZARD STONE
FURNLEG	FURNITURE LEG
HSHOE	HORSESHOE
STHING	STRAP HINGE
HARBUCK	HARNESS BUCKLE
STVPPE	STOVE PIPE
HARMO	HARMONICA
HOOK	HOOK
PLOW	PLOW
BODY	BODY FRAG
BOTTLE	BOTTLE
PLATE	PLATE
JAR	JAR
BDBASE	BODY AND BASE FRAG
MJLID	MASON JAR LID
STOVE	STOVE
BUCKET	BUCKET
WHEEL	WHEEL
HAME	HAME
TOBCAN	TOBACCO CAN
COOKPOT	COOKING POT
CAN	CAN
NAIL	NAIL
WIREN	WIRE NAIL
ROOFN	ROOFING NAIL
STRAP	STRAP
LID	LID
BOWL	BOWL
CROCK	CROCK
METOBJ	METAL OBJECT
BASE	BASE FRAG
RIM	RIM FRAG
CAP	CAP
AXLECLIP	AXLE CLIP

FIELD 3 CONTINUED

WASHER	WASHER
PLUMB	PLUMBING
BOLT	BOLT
WSHINGLE	WALL SHINGLE
RSHINGLE	ROOF SHINGLE
MARBLE	MARBLE
PENCIL	PENCIL
ZIPPER	ZIPPER
EYE	METAL EYE
BULLET	BULLET
RMHND	RIM AND HANDLE FRAG
WDSCREW	WOOD SCREW
LIGHT	LIGHT BULB PART
SWITCH	SWITCH
SPARPLG	SPARK PLUG
EYELET	EYELET
NUTBOLT	NUT AND BOLT
PULTAB	PULL TAB
RIVET	RIVET
SAFPIN	safety pin
SPRING	SPRING
BEAD	BEAD
HINGE	HINGE
SNAP	SNAP
FIG	FIGURINE
MJAR	MASON JAR
DORNOB	DOOR KNOB
BEDSPRIN	BED SPRING
BUCKLE	BUCKLE
WINDOW	WINDOW
BUTTON	BUTTON
CUP	CUP
MJLIDLIN	MASON JAR LID LINING
WINDGL	WINDOW GLASS
RMBDY	RIM AND BODY FRAG
TOKEN	TOKEN
BATCOR	BATTERY CORE
FSTAPLE	FENCE STAPLE
GSHELL	GUN SHELL
PHONREC	PHONOGRAPH RECORD
SCREW	SCREW
WIRE	WIRE
AUTO	AUTOMOBILE PART
KEROCHIM	LANTERN CHIMNEY
STAPLE	STAPLE
BADGE	BADGE
LIQUOR	LIQUOR
HANDLE	HANDLE
RRSPIKE	RAILROAD SPIKE
NUT	NUT
CNAIL	CUT NAIL
HSNAIL	HORSESHOE NAIL
INSUL	INSULATOR

FIELD 3 CONTINUED

PEDEST	PEDESTAL
FURHAND	FURNITURE HANDLE
CHNLNK	CHAIN LINK FENCING
FACECREAM	FACE CREAM JAR
SHING	SHINGLE
VASE	VASE
HOSECLAMP	HOSE CLAMP
PUREX	PUREX BLEACH
NECK	NECK
SHOESHINE	SHOESHINE
FORK	FORK
SPIKE	SPIKE
CPSPRING	CLOTHES PIN SPRING
TABLEW	TABLE WARE
MDLOBJ	MODELED OBJECT
ZONE	ZONED DECORATED
BBASE	BOTTLE BASE
JBASE	JAR BASE
TEACUP	TEA CUP
WIND	WINDOW
ANV	ANVIL
BNECK	BOTTLE NECK
GROOV	GROOVE
TROWEL	TROWEL
SQUARE	SQUARE
MORTOR	MORTOR
MORTAR	MORTAR STONE
PENNY	PENNY
SPOKE	SPOKESHAVE

****

FIELD4
QUALIFIERS

BASENT	BASAL NOTCHED
BAT	BATTERED
BICON	BICONVEX
BIPO	BIPOINTED
CIRC	CIRCULAR
CNTRST	CONTRACTING STEM
CON	CONCAVE
CONBS	CONCAVE BASE
EARED	EARS ON BASE
GRNDBS	GROUND BASE
CONICAL	CONICAL
CORD	CORDIFORM
CYLIND	CYLINDRICAL
BIVEX	BICONVEX
DELT	DELTOID
DRILD	DRILLED
ELLIP	ELLIPTICAL
EXPNST	EXPANDING STEM

FIELD 4 CONTINUED

FLAT	FLAT
GROOV	GROOVED
LANCE	LANCEOLATE
LEAF	WILLOW LEAF SHAPED
NOTCH	NOTCHED
OVAT	OVATE
PERFD	PERFORATED
POLISH	POLISHED
RSHARP	RESHARPENED
RUM	RETOUCHED/UTILIZED/MODIFIED
SIDENT	SIDE NOTCHED
STRAST	STRAIGHT STEMMED
STRI	STRIATED
SFTLP	SOFT HAMMER LIP
ENGRAV	ENGRAVED
GROUND	GROUND
MDIR	MULTI-DIRECTIONAL
DECORT	DECORTICATION
BTHIN	BIFACIAL THINNING
TESTED	TESTED
LUNA	LUNATE
EXHAUST	EXHAUSTED
CMIMP	CORD MARKED OR FABRIC IMPRESSED
CRI	CORD IMPRESSED
FABI	FABRIC IMPRESSED
FILM	FILMED
FING	FINGERNAIL PUNCTATE
INCI	INCISED
INEN	INCISED OR ENGRAVED
PUNCT	PUNCTATED
REDF	RED FILMED
CHAR	CHARRED
PECK	PECKED
HAFT	HAFTED
UDIR	UNIDIRECTIONAL
VEXBS	CONVEX BASE
CLEAR	CLEAR
UNDEC	UNDECORATED
MILK	MILK GLASS
GREEN	GREEN
PRESS	PRESSED
BROWN	BROWN
LGRN	LIGHT GREEN
LAV	LAVENDER
PEACH	PEACH
UNUN	UNGLAZED-UNGLAZED
THREAD	THREADED
BRSBRS	BRISTOL-BRISTOL
DECAL	DECALCOMANIA
TRANS	TRANSFER
MOLD	MOLDED
BLUE	BLUE
STL	SEAM TO LIP

FIELD 4 CONTINUED

CROWN	CROWN TOP
GILT	GILT
MARPAR	PARTIAL MAKER'S MARK
TWIST	TWIST TOP
FLOW	FLOW
UNGLAZED	UNGLAZED
PURPLE	PURPLE
ALBBRS	ALBANY-BRISTOL
ALBALB	ALBANY-ALBANY
CARNIVAL	CARNIVAL GLASS
ETCHED	ETCHED
HPAINT	HAND PAINTED
SHELLED	SHELL EDGE
BRSALB	BRISTOL-ALBANY
LTBLUE	LIGHT BLUE
STOPPER	STOPPER TOP
RED	RED
GOLD	GOLD
YELLOW	YELLOW
PINK	PINK
DEC	DECORATED
RTREAT	RIM TREAMENT
CORNT	CORNER NOTCHED
WHITE	WHITE
ALB	ALBANY
SPONGE	SPONGE PRINT
MARKCOM	COMPLETE MAKER'S MARK
MELT	MELTED
CORK	CORK CLOSURE
COBALT	COBALT BLUE
PAINT	PAINTED
CUT	CUT
AQUA	AQUA COLOR
MARCOM	COMPLETE MAKER'S MARK
SOLIP	SEAM OVER LIP
BRICK	BRICK
PLAIN	PLAIN
ER	ERODED
CRMK	CORD MARKED
PT	POINTED TOOL
HCON	HEMICONICAL
LIN	LINEAR
ZONE	ZONED DECORATED
BUFF	BUFF COLORED
TOOL	TOOL PUNCTATE
LBLUE	LIGHT BLUE
CURVE	CURVED
TRIA	TRIANGULAR PUNCTATE
RND	ROUND PUNCTATE
LINCRV	CURVED LINE
NODED	NODED POTTERY
ANNUL	ANNULAR
MALE	MALE

FIELD 4 CONTINUED

FEMALE	FEMALE
JA	JUVENILE-ADULT
INF	INFANT
ADULT	ADULT
SAW	SAWED
SALUN	SALT-UN
TRIA	TRIANGULAR
TRI	TRIANGULAR
ENG	ENGRAVED
SQRE	SQUARE/RECTANGULAR PUNCTATE
STRAP	STRAP
JUV	JUVENILE
VCUT	V-SHPATED C
VCUT	V-SHAPED CUT
LOBE	LOBE
FLRIM	FLARING RIM
SLIP	SLIP
TAB	TABULAR
LOOP	LOOP
FROG	FROG
UCUT	U-SHAPED GROOVE
EFG	EFFIGY
DUCK	DUCK
THEAD	T-HEADED
INCINT	INCISED INTERIOR
INCICH	INCISED CHEVRON
STRIPE	STRIPPED
PINCH	PINCHED
BIRD	BIRD EFFIGY
DENT	DENTICULATE
CHEVRON	CHEVRON INCISED
EXT	EXTERNAL
COKEBOT	COKE BOTTLE
INTEXT	INTERNAL/EXTERNAL
SERRATED	SERRATED
L	LARGER THAN 1/2"
G	GREATER THAN 1"
LESS	LESS THAN 1"
CORD	CORDMARK
CORDMARK	CORDMARKED

****

FIELD5
RAW MATERIAL

ARG	ARGILLITE
AGT	AGATE
ASP	ASPHALT
BIT	BITUMINOUS COAL
BLT	BASALT
BONE	BONE
BREC	BRECCIA
CANC	CANNEL COAL
CHK	CHALK
CLAY	CLAY
COAL	COAL
CONG	CONGLOMERATE
CRT	CHERT
DIO	DIORITE
DOL	DOLOMITE
GLEN	GALENA
FLINT	FLINT
FOS	FOSSIL
GRA	GRANITE
GRAD	GRANITOID
HEM	HEMATITE
LS	LIMESTONE
LIG	LIGNITE
LIM	LIMONITE
MAG	MAGNETITE
MARBLE	MARBLE
FERS	FERRUGINOUS
NOV	NOVACULITE
OBS	OBSIDIAN
OQZ	ORTHOQUARTZITE
PEWD	PETRIFIED WOOD
QTZ	QUARTZ
QXL	QUARTZ CRYSTAL
QZIT	QUARTZITE
RHY	RHYOLITE
SCH	SCHIST
SHL	SHALE
SILT	SILTSTONE
SLT	SLATE
SS	SANDSTONE
STEA	STEATITE
WOOD	WOOD
MANG	MANGANESE
LEAD	LEAD
IND	INDETERMINATE
PITK	PITKIN CHERT
OOL	oolitic chert
MILLCR	MILL CREEK CHERT
WHCRT	WHITE CHERT
GRCRT	GRAY CHERT

FIELD 5 CONTINUED

UCRT	UNKNOWN CHERT
GROG	GROG-TEMPERED
GROSH	GROG AND SHELL-TEMPERED
BOO	BOONE CHERT
LEM	LIMONITE & HEMATITE CONCRETION
SHELLT	SHELL-TEMPERED
SAND	SAND-TEMPERED
NUT	NUT HULL
SEED	SEED
EARTHW	EARTHENWARE
GLASS	GLASS
METAL	METAL
STONEW	STONEWARE
PORCE	PORCELAIN
BRICK	BRICK
FABRIC	FABRIC
LEATH	LEATHER
FOSSIL	FOSSIL
SYN	SYNTHETIC
PAPER	PAPER
MORTAR	MORTAR
EUCERAM	EUROPEAN CERAMIC
HLITHIC	HISTORIC LITHIC
REDW	REDWARE
COARSE	COARSEWARE
AGATE	AGATEWARE
CANEW	CANEWARE
WHITEW	WHITEWARE
CREAMW	CREAMWARE
PEARLW	PEARLWARE
PLAST	PLASTIC
RUBBER	RUBBER
ALUM	ALUMINUM
GRAPH	GRAPHITE
LINM	LINOLEUM
TAR	TAR
BRASS	BRASS
TIN	TIN
COPPER	COPPER
CNCRETE	CONCRETE
YELLOWW	YELLOW WARE
SHELL	SHELL
TOOTH	TOOTH
DOVER	DOVER CHERT
MILL CR	MILL CREEK CHERT
MILL CR	MILL CREEK CHERT
SHED	SHELL AND SAND TEMPEREd
LAV	LAVENDER
TURTLE	TURTLE REMAINS
BURL	BURLINGTON CHERT
GROSAN	GROG AND SAND TEMPERED
PUM	PUMICE
CRESRDG	CRESCENT RIDGE CHERT

FIELD 5 CONTINUED

SHELSAN	SHELL AND SAND TEMPEREd
FTPAYNE	FT. PAYNE CHERT
CRSCNT	CRESCENT CHERT
RSHARP	RESHARPENED
KAOLIN	KAOLIN CHERT
FIBBOARD	FIBER BOARD
IG	IGNEOUS
CORNCOB	CORNCOB

****

FIELD6
TYPE

BARNES	BARNES
NODENA	NODENA
BELLPL	BELL PLAIN
MADISON	MADISON
BELPLA	BELL PLAIN
BELL	BELL PASTE
VARN	VARNEY
SCHUG	SCHUGTOWN
STEUBEN	STEUBEN
DENTON	DENTON
SCALLORN	SCALLORN

****

FIELD7
VARIETY

BANKS	BANKS
CLASS	CLASSIC

APPENDIX B

SCOPE OF WORK

SECTION C

Description/Specifications/Scope of Work

Archeological Mitigation of site 23S0496, Castor River Channel Enlargement, Stoddard County, Missouri.

C-1. GENERAL.

C-1.1. The Contractor shall conduct a mitigation investigation, of archelogical site 23S0496 on the Castor River in Stoddard, County, Missouri. Reports of this investigation shall be submitted. These tasks are in partial fulfillment of the Memphis District's obligations under the National Historic Preservation Act of 1966 (P.L. 89-665), as amended; the National Environment Policy Act of 1969 (P.L. 91-190); Executive Order 11593, "Protection and Enhancement of Cultural Environment," 13 May 1971 (36 CFR Part 800); Preservation of Historic and Archeological Data, 1974 (P.L. 93-291), as amended; and the Advisory Council on Historic Preservation, "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800).

C-1.2. Personnel Standards.

a. The Contractor shall utilize a systematic, interdisciplinary approach to conduct the study. Specialized knowledge and skills will be used during the course of the study to include expertise in archeology, history, architecture, geology and other disciplines as required to fulfill requirements of this Scope of Work. Techniques and methodologies used for the study shall be representative of the state of current professional knowledge and development.

b. The following minimal experiential and academic standards shall apply to personnel involved in investigations described in this Scope of Work:

(1) Archeological Project Directors or Principal Investigator(s) (PI). Individuals in charge of an archeological project or research investigation contract, in addition to meeting the appropriate standards for archeologist, must have a publication record that demonstrates extensive experience in successful field project formulation, execution and technical monograph reporting. It is mandatory that at least one individual acting as Principal Investigator or Project Director under this contract have demonstrated competence and ongoing interest in comparable cultural resources or archeological research in the Northeast Arkansas Region. Extensive prior research experience as Principal Investigator or Project Director in immediately adjacent areas will also satisfy this requirement. The requirement may also be satisfied by utilizing consulting Co-principal Investigators averaging no less than 24 paid hours per month for the duration of contract activities. Changes in any Project Director or Principal Investigator must be approved by the Contracting Officer. The Contracting Officer may require suitable professional references to obtain estimates regarding the adequacy of prior work.

(2) Archeologist. The minimum formal qualifications for individuals practicing archeology as a profession are a B.A. or B.S. degree from an accredited college or university, followed by a minimum of two years of successful graduate study or equivalent with concentration in anthropology and specialization in archeology and at least two summer field schools or their equivalent under the supervision of archeologists of recognized competence. A Master's thesis or its equivalent in research and publication is highly recommended, as is the M.A. degree.

(3) Architectural Historian. The minimum professional qualifications in architectural history are a graduate degree in architectural history, historic preservation, or closely related fields, with course work in American architectural history; or a bachelor's degree in architectural history, historic preservation, or closely related field plus one of the following:

(a) At least two years full-time experience in research, writing, or teaching in American history or restoration architecture with an academic institution, historical organization or agency, museum, or other professional institution; or

(b) Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

(4) Other Professional Personnel. All other personnel utilized for their special knowledge and expertise must have a B.A. or B.S. degree from an accredited college or university, followed by a minimum of two years of successful graduate study with concentration in appropriate study and a publication record demonstrating competing in the field of study.

(5) Other Supervisory Personnel. Persons in any supervisory position must hold a B.A., B.S. or M.A. degree with a concentration in the appropriate field of study and a minimum of 2 years of field and laboratory experience in tasks similar to those to be performed under this contract.

(6) Crew Members and Lab Workers. All crew members and lab workers must have prior experience compatible with the tasks to be performed under this contract. An academic background in the appropriate field of study is highly recommended.

c. All operations shall be conducted under the supervision of qualified professionals in the discipline appropriate to the data that is to be discovered, described or analyzed. Vitae of personnel involved in project activities may be required by the Contracting Officer at anytime during the period of service of this contract.

C-1.3. The Contractor shall designate in writing the name or names of the Principal Investigator(s). Participation time of the Principal Investigator(s) shall average a minimum of 50 hours per month during the period of service of this contract. In the event of controversy or court challenge, the Principal Investigator shall be available to testify with respect to report findings. The additional services and expenses would be at Government expense, per paragraph C-1.8 below.

C-1.4. The Contractor shall keep standard field records which may be reviewed by the Contracting Officer. These records shall include field notes, appropriate state site survey forms and any other cultural resource forms and/or records, field maps and photographs necessary to successfully implement requirements of this Scope of Work.

C-1.5. To conduct the field investigation, the Contractor will obtain all necessary permits, licenses; and approvals from all local, state and Federal authorities. Should it become necessary in the performance of the work and services of the Contractor to secure the right of ingress and egress to perform any of the work required herein on properties not owned or controlled by the Government, the Contractor shall secure the consent of the owner, his representative, or agent, prior to effecting entry on such property.

C-1.6. Innovative approaches to data location, collection, description and analysis, consistent with other provisions of this contract and the cultural resources requirements of the Memphis District, are encouraged.

C-1.7. No mechanical power equipment shall be utilized in any cultural resource activity without specific written permission of the Contracting Officer.

C-1.8. The Contractor shall furnish expert personnel to attend conferences and furnish testimony in any judicial proceedings involving the archeological and historical study, evaluation, analysis and report. When required, arrangements for these services and payment therefor will be made by representatives of either the Corps of Engineers or the Department of Justice.

C-1.9. The Contractor, prior to the acceptance of the final report, shall not release any sketch, photograph, report or other material of any nature obtained or prepared under this contract without specific written approval of the Contracting Officer.

C-1.10. The extent and character of the work to be accomplished by the Contractor shall be subject to the general supervision, direction, control and approval of the Contracting Officer. The Contracting Officer may have a representative of the Government present during any or all phases of Scope of Work requirements.

C-1.11. The Contractor shall obtain Corps of Engineers Safety Manual (EM 385 -1-1) and comply with all appropriate provisions. Particular attention is directed to safety requirements relating to the deep excavation of soils.

C-1.12. There will be two categories of meetings between Contractor and Contracting Officer: (1) scheduled formal conferences to review contract performance, and (2) informal, unscheduled meetings for clarification, assistance, coordination and discussion. The initial meeting shall be held prior to the beginning of field work. Category (1) meetings will be scheduled by the Contracting Officer and will be held at the most convenient location, to be chosen by the Contracting Officer. This may sometimes be on the project site, but generally will be at the office of the Contracting Officer.

C-2. STUDY AREA.

C-2.1. The Castor River Enlargement project is located in Stoddard County, Missouri. The proposed improvements include ditch cleanout and piling excavated materials on the ditch banks. Site 23S0496 is located in T27N,R10E, SW 1/4, SE 1/4, NE 1/4 of Section 21 at UTM Zone 16, ES36120, N4095600 at Station No. 565+00, on the left descending bank, on the Bloomfield Missouri, 7.5 min. quadrangle map.

C-3. DEFINITIONS.

C-3.1. "Cultural resources" are defined to include any building, site, district, structure, object, data, or other material relating to the history, architecture, archeology, or culture of an area.

C-3.2. "Background and Literature Search" is defined as a comprehensive examination of existing literature and records for the purpose of inferring the potential presence and character of cultural resources in the study area. The examination may also serve as collateral information to field data in evaluating the eligibility of cultural resources for inclusion in the National Register of Historic Places or in ameliorating losses of significant data in such resources.

C-3.3. "Intensive Survey" is defined as a comprehensive, systematic, and detailed on-the-ground survey of an area, of sufficient intensity to determine the number, types, extent and distribution of cultural resources present and their relationship to project features.

C-3.4. "Mitigation" is defined as the amelioration of losses of significant prehistoric, historic, or architectural resources which will be accomplished through preplanned actions to avoid, preserve, protect, or minimize adverse effect upon such resources or to recover a representative sample of the data they contain by implementation of scientific research and other professional techniques and procedures. Mitigation of losses of cultural resources includes, but is not limited to, such measures as: (1) recovery and preservation of an adequate sample of archeological data to allow for analysis and published interpretation of the cultural and environmental conditions prevailing at the time(s) the area was utilized by man; (2) recording, through architectural quality photographs and/or measured drawings of buildings, structures, districts, sites and objects and deposition of such documentation in the Library of Congress as a part of the National Architectural and Engineering Record; (3) relocation of buildings, structures and objects; (4) modification of plans or authorized projects to provide for preservation of resources in place; (5) reduction or elimination of impacts by engineering solutions to avoid mechanical effects of wave wash, scour, sedimentation and related processes and the effects of saturation.

C-3.5. "Reconnaissance" is defined as an on-the-ground examination of selected portions of the study area, and related analysis adequate to assess the general nature of resources in the overall study area and the probable impact on resources of alternate plans under consideration. Normally reconnaissance will involve the intensive examination of not more than 15 percent of the total proposed impact area.

C-3.6. "Significance" is attributable to those cultural resources of historical, architectural, or archeological value when such properties are included in or have been determined by the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places after evaluation against the criteria contained in 36 CFR 63.

C-3.7. "Testing" is defined as the systematic removal of the scientific, prehistoric, historic, and/or archeological data that provide an archeological or architectural property with its research or data value. Testing may include controlled surface survey, shovel testing, profiling, and limited subsurface test excavations of the properties to be affected for purposes of research planning, the development of specific plans for research activities, excavation, preparation of notes and records, and other forms of physical removal of data and the material analysis of such data and material, preparation of reports on such data and material and dissemination of reports and other products of the research. Subsurface testing shall not proceed to the level of mitigation.

C-3.8. "Analysis" is the systematic examination of material data, environmental data, ethnographic data, written records, or other data which may be prerequisite to adequately evaluating those qualities which contribute to their significance.

C-4. GENERAL PERFORMANCE SPECIFICATIONS.

C-4.1. Research Design.

Mitigation will be conducted within the framework of a regional research design including, where appropriate, questions discussed in the State Plan. All typological units not generated in these investigation, shall be adequately referenced. It should be noted that artifactual typologies constructed for other areas may or may not be suitable for use in the study area. It is, therefore, of great importance that considerable effort be spent in recording and describing artifactual characteristics treated as diagnostic in this study as well as explicit reasons for assigning (or not assigning) specific artifacts to various classificatory units.

C-4.2. Background and Literature Search.

a. This task shall include an examination of the historic and prehistoric environmental setting and cultural background of the study area and shall be of sufficient magnitude to achieve a detailed understanding of the overall cultural and environmental context of the study area. It is axiomatic that the background and literature search shall normally preceed the initiation of all fieldwork.

b. Information and data for the literature search shall be obtained, as appropriate, from the following sources: (1) Scholarly reports - books, journals, theses, dissertations and unpublished papers; (2) Official Records - Federal, state, county and local levels, property deeds, public works and other regulatory department records and maps; (3) Libraries and Museums - both regional and local libraries, historical societies, universities, and museums; (4) Other repositories - such as private collections, papers, photographs, etc.; (5) Archeological site files at local universities, the State Historic Preservation Office, the office of the State Archeologist; (6) Consultation with qualified professionals familiar with the cultural resources in the area, as well as consultation with professionals in associated areas such as history, sedimentology, geomorphology, agronomy, and ethnology.

c. The Contractor shall include as an appendix to the draft and final reports, written evidence of all consultation and any subsequent responses(s), including the dates of such consultation and communications.

C-4.3. Testing Activities.

a. Initial Site Testing.

(1) Surface collection of the site area shall be accomplished in order to obtain data representative of total site surface content. Both historic and prehistoric items shall be collected. The Contractor shall carefully note and record descriptions of surface conditions of the site including ground cover and the suitability of soil surfaces for detecting cultural items (ex: recent rainfall, standing water or mud).

(2) Stringent horizontal spatial control of collecting shall be maintained by relating the location of all collection units to the primary site datum either by means of a grid system (including those used in controlled surface collection) or by azimuth and distance.

(3) Before the surface collection begins the contractor hall have the project right-of-way shallow plow. Plowing shall be done with a farm tractor. Plowing will go no deeper than the existing plow zone depth.
Surface collection will not be conducted until after the plowed right-of-way has been thourghly wetted-down (by mechanical or natural means) enough that the antifacts are exposed.

(4) The right-of-way will be collected in 5M & 5M units. All of which will be tied into the site datum.

C-4.4. Laboratory Processing, Analysis, and Preservation.

All cultural materials recovered will be cleaned and stored in deterioration resistant containers suitable for long term curation. Diagnostic artifacts will be labeled and catalogued individually. A diagnostic artifact is defined herein as any object which contributes individually to the needs of analysis required by this Scope of Work or the research design. All other artifacts recovered must minimally be placed in labeled, deterioration resistant containers, and the items catalogued. The Contractor shall describe and analyze all cultural materials recovered in accordance with current professional standards. Artifactual and non-artifactual analysis shall be of an adequate level and nature to fulfill the requirements of this Scope of Work. All recovered cultural items shall be catalogued in a manner consistent with Missouri state requirements. The Contractor shall consult with appropriate state officials as soon as possible following the conclusion of field work in order to obtain information (ex: accession numbers) prerequisite to such cataloging procedures.

C-4.5. Curation.

Efforts to insure the permanent curation of properly cataloged cultural resources materials and project documentation in an appropriate institution shall be considered an integral part of the requirements of this Scope of Work. The Contractor shall pay all cost of the preparation and permanent curation of records and artifacts. An arrangement for curation shall be confirmed by the Contractor, subject to the approval of the Contracting Officer, prior to the acceptance of the final report.

C-5. GENERAL REPORT REQUIREMENTS.

C-5.1. The primary purpose of the cultural resources report is to serve as a planning tool which aids the Government in meeting its obligations to preserve and protect our cultural heritage. The report will be in the form of a comprehensive, scholarly document that not only fulfills mandated legal requirements but also serves as a scientific reference for future cultural resources studies. As such, the report's content must be not only descriptive but also analytic in nature.

C-5.2. Upon completion of all field investigation and research, the Contractor shall prepare a report detailing the work accomplished, the results, and recommendations for each project area. Copies of the draft and final reports of investigation shall be submitted in a form suitable for publication and be prepared in a format reflecting contemporary organizational and illustrative standards for current professional archeological journals. The final report shall be typed on standard size 8-1/2" x 11" bond paper with pages numbered and with page margins one inch at top, bottom, and sides. Photographs, plans, maps, drawings and text shall be clean and clear. The final report shall be bound in a high quality professional type binding. The project title shall appear on the front cover.

C-5.3. The report shall include, but not necessarily be limited to, the following sections and items:

a. Title Page. The title page should provide the following information; the type of task undertaken, the study areas and cultural resources which were assessed; the location (county and state), the date of the report; the contract number; the name of the author(s) and/or the Principal Investigator; and the agency for which the report is being prepared. If a report has been authored by someone other than the Principal Investigator, the Principal Investigator must at least prepare a foreword describing the overall research context of the report, the significance of the work, and any other related background circumstances relating to the manner in which the work was undertaken.

b. Abstract. an abstract suitable for publication in an abstract journal shall be prepared and shall consist of a brief, quotable summary useful for informing the technically-oriented professional public of what the author considers to be the contributions of the investigation to knowledge.

c. Table of Contents.

d. Introduction. This section shall include the purpose of the report, a description of the proposed project, a map of the general area, a project map, and the dates during which the investigations were conducted. The introduction shall also contain the name of the institution where recovered materials and documents will be curated.

e. Environmental Context. This section shall contain, but not be limited to, a discussion of probable past floral, faunal, and climatic characteristics of the project area. Since data in this section may be used in the evaluation of specific cultural resource significance, it is imperative that the quantity and quality of environmental data be sufficient to allow subsequent detailed analysis of the relationship between past cultural activities and environmental variables.

f. Previous Research. This section shall describe previous research which may be useful in deriving or interpreting relevant background data, problem domains, or research questions and in providing a context in which to examine the probability of occurrence and significance of cultural resources in the study area.

g. Literature Search and Personal Interviews. This section shall discuss the results of the literature search, including specific data sources, and personal interviews which were conducted during the course of investigations.

i. Survey, Testing and Analytical Methods. This section shall contain an explicit discussion of the research design, and shall demonstrate how environmental data, previous research data, the literature search and personal interviews have been utilized in constructing the strategy. Specific research domains and questions as well as methodological strategies employed to address those questions should be included where possible.

j. Recommendations.

(1) This section should contain, assessments of the eligibility of specific cultural properties in the study area for inclusion in the National Register of Historic Places.

(2) Significance should be discussed explicitly in terms of previous regional and local research and relevant problem domains. Statements concerning significance shall contain a detailed, well-reasoned argument for the property's research potential in contributing to the understanding of cultural patterns, processes or activities important to the history or prehistory of the locality, region or nation, or other criteria of significance. Where appropriate, due consideration should be given to the data potential of such variables as site functional characteristics, horizontal intersite or intrasite spatial patterning of data and the importance of the site as a representative systemic element in the patterning of human behavior. All report conclusions and recommendations shall be logically and explicitly derived from data discussed in the report.

(3) The significance of cultural resoures can be determined adequately only within the context of the most recent available local and regional data base. These resources shall relate not only to previously known cultural data but also to a synthesized interrelated corpus of data including those data generated in the present study.

k. References (American Antiquity Style).

l. Appendices (Maps, Correspondence, etc.). A copy of this Scope of Work and, when stipulated by the Contracting Officer, review comments shall be included as appendices to the final report of investigations.

C-5.4. The above items do not necessarily have to be discrete sections; however, they should be readily discernible to the reader.

C-5.5. In order to prevent potential damage to cultural resources, no information shall appear in the body of the report which would reveal precise resource location. All maps which indicate or imply precise site locations shall be included in reports as a readily removable appendix (e.g. envelope).

C-5.6. No logo or other such organizational designation shall appear in any part of the report (including tables or figures) other than the title page.

C-5.7. Unless specifically otherwise authorized by the Contracting Officer, all reports shall utilize permanent site numbers assigned by the state in which the study occurs.

C-5.8. All appropriate information (including typologies and other classificatory units) not generated in these contract activities shall be suitably referenced.

C-5.9. Reports shall contain site specific maps. Site maps shall indicate site datum(s), location of data collection units (surface collection units), site boundaries in relation to proposed project activities, site grid systems (where appro- priate), and such other items as the Contractor may deem appropriate to the purposes of this contract.

C-5.10. Information shall be presented in textual, tabular, and graphic forms, whichever are most appropriate, effective and advantageous to communicate necessary information. All tables, figures and maps appearing in the report shall be of publishable quality.

C-5.11. Any abbreviated phrases used in the text shall be spelled out when the phrase first occurs in the text. For example use "State Historic Preservation Officer (SHPO)" in the initial reference and thereafter "SHPO" may be used.

C-5.12. The first time the common name of a biological species is used it should be followed by the scientific name.

C-5.13. In addition to street addresses or property names, sites shall be located on the Universal Transverse Mercator (UTM) grid.

C-5.14. Generally, all measurements should be metric.

C-5.15. As appropriate, diagnostic and/or unique artifacts, cultural resources or their contexts shall be shown by drawings or photographs.

C-5.16. Black and white photographs are preferred except when color changes are important for understanding the data being presented. No instant type photographs may be used.

C-5.17. Negatives of all black and white photographs and/or color slides of all plates included in the final report shall be submitted to the Contracting Officer.

C-6. SUBMITTALS.

C-6.1. The Contractor shall submit 4 copies of the draft report and one original and 25 copies with high quality professional binding, of the final report which include appropriate revisions in response to the Contracting Officer's comments.

APPENDIX C

DESCRIPTIVE STATISTICS

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42
49	CL	FLA			INTERIOR	
50	CL	FLA			INTERIOR	
51	CL	FLA			INTERIOR	
52	CL	FLA			INTERIOR	
53	CL	FLA			POLISH	RUM
54	CL	FLA			RUM	
55	CL	FLA			RUM	
56	CL	FLA			RUM	
57	CL	FLA			RUM	DECORT
58	CL	FLA			RUM	SFTLP
59	CL	FLA			SFTLP	
60	CL	FLA			SLIP	
61	CL	FLA	END		RUM	
62	CL	FLA	SPOKS		DECORT	
63	CL	FLA	SPOKS		INTERIOR	
64	CL	FLA	SPOKS		RUM	
65	CL	PEBL			TESTED	
66	CL	PEBL			TESTED	
67	CL	PPK				
68	CL	PPK				
69	CL	PPK			G	
70	CL	PPK	ARROW			
71	CL	PPK	ARROW		SIDENT	
72	CL	PPK	DART			
73	CL	PPK	DART		CNTRST	

OBS	FIELD43	FIELD5	FIELD52	_FREQ_	MEAN	SUM
49		OQZ		10	13.000	130.0
50		PITK		4	1.700	6.8
51		QTZ		2	5.400	10.8
52		QZIT		18	6.811	122.6
53		CRT		1	4.000	4.0
54		CRT		31	6.926	214.7
55		CRT	QZIT	1	1.900	1.9
56		OQZ		1	15.000	15.0
57		CRT		16	11.400	182.4
58		CRT		2	1.300	2.6
59		CRT		5	2.260	11.3
60		CRT		4	0.750	3.0
61		CRT		1	1.000	1.0
62		CRT		3	16.067	48.2
63		CRT		7	3.829	26.8
64		CRT		3	2.600	7.8
65		CRT		3	28.033	84.1
66		QZIT		1	84.600	84.6
67		CRT		1	3.000	3.0
68		QZIT		1	3.500	3.5
69		CRT		1	3.100	3.1
70		PITK		1	0.500	0.5
71		CRT		1	1.000	1.0
72		CRT		7	7.214	50.5
73		CRT		2	6.150	12.3

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42
74	CL	PPK	DART		EXPNST	VEXBS
75	CL	SHAT				
76	CL	SHAT				
77	CL	SHAT				
78	CL	SHAT				
79	CL	SHAT				
80	CL	SHAT				
81	CL	SHAT				
82	CL	SHAT			DECORT	
83	CL	SHAT			RUM	
84	FLOR					
85	FLOR	SUBS				
86	DOM					
87	DOM		BOTTLE		CLEAR	
88	DOM	FOODPREP				
89	DOM	FOODPREP	BASE		CLEAR	
90	DOM	FOODPREP	PLATE			
91	DOM	FOODPREP	PLATE		MOLD	
92	GRL		GRIP			
93	GRL		GRIP	HAM		
94	GRL		HAM			
95	GRL		PITS			
96	GRL	CHNK	POUND			
97	OHIST					
98	OHIST				GREEN	

OBS	FIELD43	FIELD5	FIELD52	_FREQ_	MEAN	SUM
74	CORNT	CRT		1	11.900	11.9
75		CONG		1	20.000	20.0
76		CRT		89	29.428	2589.7
77		CRT	QZIT	1	15.800	15.8
78		OQZ		1	16.800	16.8
79		PITK		2	17.700	35.4
80		QTZ		1	7.500	7.5
81		QZIT		2	11.150	22.3
82		CRT		3	48.833	146.5
83		CRT		1	.	.
84				1	0.300	0.3
85		CORNCOB		1	4.200	4.2
86		GLASS		1	20.100	20.1
87		GLASS		1	3.700	3.7
88		WHITEW		1	1.500	1.5
89		EARTHW		1	2.700	2.7
90		PEARLW		1	1.300	1.3
91		WHITEW		1	4.000	4.0
92		QZIT		1	47.200	47.2
93		CRT		1	186.400	186.4
94		QZIT		1	398.000	398.0
95		QTZ		1	456.800	456.8
96		CRT		1	453.100	453.1
97		GRAPH		1	2.200	2.2
98		GLASS		1	1.000	1.0

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42	FIELD43	FIELD5	FIELD52	FREQ_	MEAN	SUM
99	OHIST		BODY		CLEAR			GLASS		1	4.500	4.5
100	POT	BODY						GROG		1	1.000	1.0
101	POT	BODY						SAND		4	1.100	4.4
102	POT	BODY			CORDMARK			SAND		1	4.700	4.7
103	POT	BODY			PLAIN			SAND		1	4.300	4.3
104	SHELL									3	5.200	15.6
105	URM							COAL		1	2.400	2.4
106	URM							CONG		1	121.400	121.4
107	URM							CRT		8	123.737	989.9
108	URM							QZIT		3	16.267	48.8
109	URM							SS		3	1.233	3.7
110	URM				G					10	235.160	2351.6
111	URM				G			CRT		54	231.500	12501.0
112	URM				G			OQZ		1	39.400	39.4
113	URM				G			QTZ		1	66.800	66.8
114	URM				G			QZIT		3	133.167	399.5
115	URM				G			SS		2	104.850	209.7
116	URM				L			CRT		1	6.500	6.5
117	URM				LESS					9	102.033	918.3
118	URM				LESS			CRT		48	75.590	3628.3
119	URM				LESS			HEM		1	1.100	1.1
120	URM				LESS			IG		1	12.000	12.0
121	URM				LESS			OQZ		6	5.333	32.0
122	URM				LESS			QTZ		1	3.400	3.4
123	URM				LESS			QZIT		7	9.329	65.3
124	URM				LESS			QZIT	CRT	2	7.650	15.3
125	URM				LESS			SS		5	2.280	11.4
126	URM	CHNK						CRT		1	129.000	129.0
127	URM	CHNK						QTZ		1	2.700	2.7
128	URM	CHNK						SS		1	84.300	84.3
129	URM	COBL						CRT		5	149.420	747.1
130	URM	COBL						QZIT		1	297.000	297.0
131	URM	COBL			G			CRT		2	44.700	89.4
132	URM	COBL			G			QZIT		1	371.700	371.7
133	URM	CORE						CRT		1	280.000	280.0
134	URM	FLA			INTERIOR			QZIT		1	18.100	18.1
135	URM	FLA			RUM			CRT		1	0.500	0.5
136	URM	PEBL								1	12.800	12.8
137	URM	PEBL						CRT		4	19.025	76.1
138	URM	PEBL			LESS			QZIT		1	2.500	2.5
139	URM	SHAT						CRT		2	3.000	6.0
140	STRUCT		BOLT					FERS		1	96.800	96.8
141	STRUCT	HARDW	BOLT					METAL		1	15.500	15.5
142	STRUCT	HARDW	NAIL					METAL		3	18.233	54.7
143	STRUCT	HARDW	NUTBOLT					METAL		1	140.700	140.7
144	FOSSIL									1	16.000	16.0

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD4	FIELD42	FIELD5	FIELD52	FREQ_	MEAN	SUM
1	.							1	77.900	77.9
2	.					QZIT		1	1.600	1.6
3	.			G				47	241.445	11347.9
4	.			G		CRT		192	185.529	35621.5
5	.			G		OQZ		1	40.900	40.9
6	.			G		QZIT		15	110.180	1652.7
7	.			G		SS		5	105.920	529.6
8	.			LESS				54	87.211	4709.4
9	.			LESS		CRT		261	42.728	11152.1
10	.			LESS		OQZ		2	22.400	44.8
11	.			LESS		PITK		1	18.400	18.4
12	.			LESS		QZIT		15	12.067	181.0
13	.			LESS		SS		3	11.033	33.1
14	.	CHNK				COAL		1	2.400	2.4
15	.	CHNK		G		QZIT		1	200.100	200.1
16	.	PEBL		LESS		QTZ		1	0.000	0.0
17	ANIM					BONE		1	0.600	0.6
18	CG	CORE				CRT		1	13.500	13.5
19	CL					CRT		1	2.000	2.0
20	CL			DECORT		CRT		1	1.200	1.2
21	CL	BIFK				CRT		4	18.200	72.8
22	CL	BIFK				OQZ		1	5.900	5.9
23	CL	BIFK		STL		CRT		1	16.000	16.0
24	CL	BIFK	CHOP			QXL		1	146.700	146.7
25	CL	BIFK	PERF	DECORT		CRT		1	27.800	27.8
26	CL	BIFK	SCR	RUM		CRT		1	36.000	36.0
27	CL	BIFK	ST2			CRT		1	29.400	29.4
28	CL	CHNK		TESTED		CRT		3	80.350	160.7
29	CL	CHNK		TESTED		QZIT		1	241.900	241.9
30	CL	COBL				CRT		1	149.300	149.3
31	CL	COBL		TESTED		CRT		12	146.642	1759.7
32	CL	COBL		TESTED		QZIT		3	229.033	687.1
33	CL	COBTO				CRT		5	120.800	604.0
34	CL	COBTO		POLISH		CRT		2	30.200	60.4
35	CL	COBTO	CHOP			CRT		3	99.733	299.2
36	CL	COBTO	CHOP			QZIT		1	394.000	394.0
37	CL	COBTO	HAM			CRT		2	202.900	405.8
38	CL	CORE				CRT		34	108.712	3696.2
39	CL	CORE		RUM		CRT		1	17.200	17.2
40	CL	CORE		TESTED		CRT		16	159.787	2556.6
41	CL	CORE		TESTED		QZIT		2	117.300	234.6
42	CL	DEBIT				CRT		1	36.200	36.2
43	CL	FLA		DECORT				1	1.100	1.1
44	CL	FLA		DECORT		CRT		95	11.784	1119.5
45	CL	FLA		DECORT		QZIT		6	9.883	59.3
46	CL	FLA		DECORT	RUM	CRT		8	17.337	138.7
47	CL	FLA		INTERIOR		CRT		192	4.201	798.2
48	CL	FLA		INTERIOR		NOV		1	0.200	0.2

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD4	FIELD42	FIELD5	FIELD52	FREQ_	MEAN	SUM
49	CL	FLA		INTERIOR		OQZ		10	13.000	130.0
50	CL	FLA		INTERIOR		PITK		4	1.700	6.8
51	CL	FLA		INTERIOR		QTZ		2	5.400	10.8
52	CL	FLA		INTERIOR		QZIT		18	6.811	122.6
53	CL	FLA		POLISH	RUM	CRT		1	4.000	4.0
54	CL	FLA		RUM		CRT		31	6.926	214.7
55	CL	FLA		RUM		CRT	QZIT	1	1.900	1.9
56	CL	FLA		RUM		OQZ		1	15.000	15.0
57	CL	FLA		RUM	DECORT	CRT		16	11.400	182.4
58	CL	FLA		RUM	SFTLP	CRT		2	1.300	2.6
59	CL	FLA		SFTLP		CRT		5	2.260	11.3
60	CL	FLA		SLIP		CRT		4	0.750	3.0
61	CL	FLA	END	RUM		CRT		1	1.000	1.0
62	CL	FLA	SPOKS	DECORT		CRT		3	16.067	48.2
63	CL	FLA	SPOKS	INTERIOR		CRT		7	3.829	26.8
64	CL	FLA	SPOKS	RUM		CRT		3	2.600	7.8
65	CL	PEBL		TESTED		CRT		3	28.033	84.1
66	CL	PEBL		TESTED		QZIT		1	84.600	84.6
67	CL	PPK				CRT		1	3.000	3.0
68	CL	PPK				QZIT		1	3.500	3.5
69	CL	PPK		G		CRT		1	3.100	3.1
70	CL	PPK	ARROW			PITK		1	0.500	0.5
71	CL	PPK	ARROW	SIDENT		CRT		1	1.000	1.0
72	CL	PPK	DART			CRT		7	7.214	50.5
73	CL	PPK	DART	CNTRST		CRT		2	6.150	12.3
74	CL	PPK	DART	EXPNST	VEXBS	CRT		1	11.900	11.9
75	CL	SHAT				CONG		1	20.000	20.0
76	CL	SHAT				CRT		89	29.428	2589.7
77	CL	SHAT				CRT	QZIT	1	15.800	15.8
78	CL	SHAT				OQZ		1	16.800	16.8
79	CL	SHAT				PITK		2	17.700	35.4
80	CL	SHAT				QTZ		1	7.500	7.5
81	CL	SHAT				QZIT		2	11.150	22.3
82	CL	SHAT		DECORT		CRT		3	48.833	146.5
83	CL	SHAT		RUM		CRT		1	.	.
84	FLOR							1	0.300	0.3
85	FLOR	SUBS				CORNCOB		1	4.200	4.2
86	DOM					GLASS		1	20.100	20.1
87	DOM		BOTTLE	CLEAR		GLASS		1	3.700	3.7
88	DOM	FOODPREP				WHITEW		1	1.500	1.5
89	DOM	FOODPREP	BASE	CLEAR		EARTHW		1	2.700	2.7
90	DOM	FOODPREP	PLATE			PEARLW		1	1.300	1.3
91	DOM	FOODPREP	PLATE	MOLD		WHITEW		1	4.000	4.0
92	GRL		GRIP			CRT		1	186.400	186.4
93	GRL		GRIP			QZIT		1	47.200	47.2
94	GRL		HAM			QZIT		1	398.000	398.0
95	GRL		PITS			QTZ		1	456.800	456.8
96	GRL	CHNK	POUND			CRT		1	453.100	453.1

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD4	FIELD42	FIELD5	FIELD52	FREQ_	MEAN	SUM
97	OHIST					GRAPH		1	2.200	2.2
98	OHIST			GREEN		GLASS		1	1.000	1.0
99	OHIST		BODY	CLEAR		GLASS		1	4.500	4.5
100	POT	BODY				GROG		1	1.000	1.0
101	POT	BODY				SAND		4	1.100	4.4
102	POT	BODY		CORDMARK		SAND		1	4.700	4.7
103	POT	BODY		PLAIN		SAND		1	4.300	4.3
104	SHELL							3	5.200	15.6
105	URM					COAL		1	2.400	2.4
106	URM					CONG		1	121.400	121.4
107	URM					CRT		8	123.737	989.9
108	URM					QZIT		3	16.267	48.8
109	URM					SS		3	1.233	3.7
110	URM			G				10	235.160	2351.6
111	URM			G		CRT		54	231.500	12501.0
112	URM			G		OQZ		1	39.400	39.4
113	URM			G		QTZ		1	66.800	66.8
114	URM			G		QZIT		3	133.167	399.5
115	URM			G		SS		2	104.850	209.7
116	URM			L		CRT		1	6.500	6.5
117	URM			LESS				9	102.033	918.3
118	URM			LESS		CRT		48	75.590	3628.3
119	URM			LESS		HEM		1	1.100	1.1
120	URM			LESS		IG		1	12.000	12.0
121	URM			LESS		OQZ		6	5.333	32.0
122	URM			LESS		QTZ		1	3.400	3.4
123	URM			LESS		QZIT		7	9.329	65.3
124	URM			LESS		QZIT	CRT	2	7.650	15.3
125	URM			LESS		SS		5	2.280	11.4
126	URM	CHNK				CRT		1	129.000	129.0
127	URM	CHNK				QTZ		1	2.700	2.7
128	URM	CHNK				SS		1	84.300	84.3
129	URM	COBL				CRT		5	149.420	747.1
130	URM	COBL				QZIT		1	297.000	297.0
131	URM	COBL		G		CRT		2	44.700	89.4
132	URM	COBL		G		QZIT		1	371.700	371.7
133	URM	CORE				CRT		1	280.000	280.0
134	URM	FLA		INTERIOR		QZIT		1	18.100	18.1
135	URM	FLA		RUM		CRT		1	0.500	0.5
136	URM	PEBL						1	12.800	12.8
137	URM	PEBL				CRT		4	19.025	76.1
138	URM	PEBL		LESS		QZIT		1	2.500	2.5
139	URM	SHAT				CRT		2	3.000	6.0
140	STRUCT		BOLT			FERS		1	96.800	96.8
141	STRUCT	HARDW	BOLT			METAL		1	15.500	15.5
142	STRUCT	HARDW	NAIL			METAL		3	18.233	54.7
143	STRUCT	HARDW	NUTBOLT			METAL		1	140.700	140.7
144	FOSSIL							1	16.000	16.0

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY COUNT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42	FIELD43	FIELD5	FIELD52	FREQ_	MEAN	SUM
1	.									1	.	.
2	.							QZIT		1	.	.
3	.				G					47	.	.
4	.				G			CRT		192	.	.
5	.				G			OQZ		1	.	.
6	.				G			QZIT		15	.	.
7	.				G			SS		5	.	.
8	.				LESS					54	.	.
9	.				LESS			CRT		261	1.00000	1
10	.				LESS			OQZ		2	.	.
11	.				LESS			PITK		1	.	.
12	.				LESS			QZIT		15	.	.
13	.				LESS			SS		3	.	.
14	.	CHNK						COAL		1	1.00000	1
15	.	CHNK			G			QZIT		1	.	.
16	.	PEBL			LESS			QTZ		1	.	.
17	ANIM							BONE		1	1.00000	1
18	CG	CORE						CRT		1	1.00000	1
19	CL							CRT		1	1.00000	1
20	CL				DECORT			CRT		1	1.00000	1
21	CL	BIFK						CRT		4	1.00000	4
22	CL	BIFK						OQZ		1	1.00000	1
23	CL	BIFK			STL			CRT		1	1.00000	1
24	CL	BIFK	CHOP					QXL		1	1.00000	1
25	CL	BIFK	PERF		DECORT			CRT		1	1.00000	1
26	CL	BIFK	SCR		RUM			CRT		1	1.00000	1
27	CL	BIFK	ST2					CRT		1	1.00000	1
28	CL	CHNK			TESTED			CRT		3	1.00000	3
29	CL	CHNK			TESTED			QZIT		1	1.00000	1
30	CL	COBL						CRT		1	1.00000	1
31	CL	COBL			TESTED			CRT		12	1.00000	12
32	CL	COBL			TESTED			QZIT		3	1.33333	4
33	CL	COBTO						CRT		5	1.00000	5
34	CL	COBTO			POLISH			CRT		2	1.00000	2
35	CL	COBTO	CHOP					CRT		3	1.00000	3
36	CL	COBTO	CHOP					QZIT		1	1.00000	1
37	CL	COBTO	HAM					CRT		2	1.00000	2
38	CL	CORE						CRT		34	1.48485	49
39	CL	CORE			RUM			CRT		1	1.00000	1
40	CL	CORE			TESTED			CRT		16	1.06667	16
41	CL	CORE			TESTED			QZIT		2	1.00000	2
42	CL	DEBIT						CRT		1	2.00000	2
43	CL	FLA			DECORT					1	2.00000	2
44	CL	FLA			DECORT			CRT		95	1.65957	156
45	CL	FLA			DECORT			QZIT		6	1.00000	6
46	CL	FLA			DECORT	RUM		CRT		8	1.50000	12
47	CL	FLA			INTERIOR			CRT		192	2.74603	519
48	CL	FLA			INTERIOR			NOV		1	2.00000	2

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY COUNT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42	FIELD43	FIELD5	FIELD52	FREQ_	MEAN	SUM
49	CL	FLA			INTERIOR			OQZ		10	1.00000	10
50	CL	FLA			INTERIOR			PITK		4	1.25000	5
51	CL	FLA			INTERIOR			QTZ		2	1.00000	2
52	CL	FLA			INTERIOR			QZIT		18	1.33333	24
53	CL	FLA			POLISH	RUM		CRT		1	1.00000	1
54	CL	FLA			RUM			CRT		31	1.35484	42
55	CL	FLA			RUM			CRT	QZIT	1	1.00000	1
56	CL	FLA			RUM			OQZ		1	1.00000	1
57	CL	FLA			RUM	DECORT		CRT		16	1.33333	20
58	CL	FLA			RUM	SFTLP		CRT		2	1.00000	2
59	CL	FLA			SFTLP			CRT		5	1.00000	5
60	CL	FLA			SLIP			CRT		4	1.00000	4
61	CL	FLA	END		RUM			CRT		1	1.00000	1
62	CL	FLA	SPOKS		DECORT			CRT		3	1.00000	3
63	CL	FLA	SPOKS		INTERIOR			CRT		7	1.00000	7
64	CL	FLA	SPOKS		RUM			CRT		3	1.00000	3
65	CL	PEBL			TESTED			CRT		3	1.00000	3
66	CL	PEBL			TESTED			QZIT		1	1.00000	1
67	CL	PPK						CRT		1	1.00000	1
68	CL	PPK						QZIT		1	1.00000	1
69	CL	PPK			G			CRT		1	1.00000	1
70	CL	PPK	ARROW					PITK		1	1.00000	1
71	CL	PPK	ARROW		SIDENT			CRT		1	1.00000	1
72	CL	PPK	DART					CRT		7	1.00000	7
73	CL	PPK	DART		CNTRST			CRT		2	1.00000	2
74	CL	PPK	DART		EXPNST	VEXBS	CORNT	CRT		1	1.00000	1
75	CL	SHAT						CONG		1	1.00000	1
76	CL	SHAT						CRT		89	1.57303	140
77	CL	SHAT						CRT	QZIT	1	1.00000	1
78	CL	SHAT						OQZ		1	1.00000	1
79	CL	SHAT						PITK		2	1.00000	2
80	CL	SHAT						QTZ		1	1.00000	1
81	CL	SHAT						QZIT		2	1.00000	2
82	CL	SHAT			DECORT			CRT		3	1.00000	3
83	CL	SHAT			RUM			CRT		1	1.00000	1
84	FLOR									1	1.00000	1
85	FLOR	SUBS						CORNCOB		1	1.00000	1
86	DOM							GLASS		1	1.00000	1
87	DOM		BOTTLE		CLEAR			GLASS		1	1.00000	1
88	DOM	FOODPREP						WHITEW		1	1.00000	1
89	DOM	FOODPREP	BASE		CLEAR			EARTHW		1	1.00000	1
90	DOM	FOODPREP	PLATE					PEARLW		1	1.00000	1
91	DOM	FOODPREP	PLATE		MOLD			WHITEW		1	1.00000	1
92	GRL		GRIP					QZIT		1	1.00000	1
93	GRL		GRIP	HAM				CRT		1	1.00000	1
94	GRL		HAM					QZIT		1	1.00000	1
95	GRL		PITS					QTZ		1	1.00000	1
96	GRL	CHNK	POUND					CRT		1	1.00000	1

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY COUNT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42	FIELD43	FIELD5	FIELD52	FREQ_	MEAN	SUM
97	OHIST							GRAPH		1	1.0	1
98	OHIST				GREEN			GLASS		1	1.0	1
99	OHIST		BODY		CLEAR			GLASS		1	1.0	1
100	POT	BODY						GROG		1	1.0	1
101	POT	BODY						SAND		4	1.0	4
102	POT	BODY			CORDMARK			SAND		1	1.0	1
103	POT	BODY			PLAIN			SAND		1	2.0	2
104	SHELL									3	1.0	3
105	URM							COAL		1	1.0	1
106	URM							CONG		1	1.0	1
107	URM							CRT		8	36.0	72
108	URM							QZIT		3	1.0	1
109	URM							SS		3	.	.
110	URM				G					10	.	.
111	URM				G			CRT		54	37.5	75
112	URM				G			OQZ		1	.	.
113	URM				G			QTZ		1	1.0	1
114	URM				G			QZIT		3	.	.
115	URM				G			SS		2	.	.
116	URM				L			CRT		1	.	.
117	URM				LESS					9	.	.
118	URM				LESS			CRT		48	4.0	4
119	URM				LESS			HEM		1	.	.
120	URM				LESS			IG		1	.	.
121	URM				LESS			OQZ		6	.	.
122	URM				LESS			QTZ		1	.	.
123	URM				LESS			QZIT		7	.	.
124	URM				LESS			QZIT	CRT	2	.	.
125	URM				LESS			SS		5	.	.
126	URM	CHNK						CRT		1	.	.
127	URM	CHNK						QTZ		1	1.0	1
128	URM	CHNK						SS		1	.	.
129	URM	COBL						CRT		5	.	.
130	URM	COBL						QZIT		1	.	.
131	URM	COBL			G			CRT		2	1.0	1
132	URM	COBL			G			QZIT		1	.	.
133	URM	CORE						CRT		1	2.0	2
134	URM	FLA			INTERIOR			QZIT		1	1.0	1
135	URM	FLA			RUM			CRT		1	1.0	1
136	URM	PEBL								1	1.0	1
137	URM	PEBL						CRT		4	.	.
138	URM	PEBL			LESS			QZIT		1	.	.
139	URM	SHAT						CRT		2	1.0	2
140	STRUCT		BOLT					FERS		1	5.0	5
141	STRUCT	HARDW	BOLT					METAL		1	1.0	1
142	STRUCT	HARDW	NAIL					METAL		3	1.0	3
143	STRUCT	HARDW	NUTBOLT					METAL		1	1.0	1
144	FOSSIL									1	1.0	1

CASTOR DATA SUMMARY ACROSS ALL FIELDS
DATA WEIGHTED BY WEIGHT

OBS	FIELD1	FIELD2	FIELD3	FIELD32	FIELD4	FIELD42	FIELD43	FIELD5	FIELD52	FREQ_	MEAN	SUM
1	.									1	77.900	77.9
2	.							QZIT		1	1.600	1.6
3	.				G					47	241.445	11347.9
4	.				G			CRT		192	185.529	35621.5
5	.				G			OQZ		1	40.900	40.9
6	.				G			QZIT		15	110.180	1652.7
7	.				G			SS		5	105.920	529.6
8	.				LESS					54	87.211	4709.4
9	.				LESS			CRT		261	42.728	11152.1
10	.				LESS			OQZ		2	22.400	44.8
11	.				LESS			PITK		1	18.400	18.4
12	.				LESS			QZIT		15	12.067	181.0
13	.				LESS			SS		3	11.033	33.1
14	.	CHNK						COAL		1	2.400	2.4
15	.	CHNK			G			QZIT		1	200.100	200.1
16	.	PEBL			LESS			QTZ		1	0.000	0.0
17	ANIM							BONE		1	0.600	0.6
18	CG	CORE						CRT		1	13.500	13.5
19	CL							CRT		1	2.000	2.0
20	CL				DECORT			CRT		1	1.200	1.2
21	CL	BIFK						CRT		4	18.200	72.8
22	CL	BIFK						OQZ		1	5.900	5.9
23	CL	BIFK			STL			CRT		1	16.000	16.0
24	CL	BIFK	CHOP					QXL		1	146.700	146.7
25	CL	BIFK	PERF		DECORT			CRT		1	27.800	27.8
26	CL	BIFK	SCR		RUM			CRT		1	36.000	36.0
27	CL	BIFK	ST2					CRT		1	29.400	29.4
28	CL	CHNK			TESTED			CRT		3	80.350	160.7
29	CL	CHNK			TESTED			QZIT		1	241.900	241.9
30	CL	COBL						CRT		1	149.300	149.3
31	CL	COBL			TESTED			CRT		12	146.642	1759.7
32	CL	COBL			TESTED			QZIT		3	229.033	687.1
33	CL	COBTO						CRT		5	120.800	604.0
34	CL	COBTO			POLISH			CRT		2	30.200	60.4
35	CL	COBTO	CHOP					CRT		3	99.733	299.2
36	CL	COBTO	CHOP					QZIT		1	394.000	394.0
37	CL	COBTO	HAM					CRT		2	202.900	405.8
38	CL	CORE						CRT		34	108.712	3696.2
39	CL	CORE			RUM			CRT		1	17.200	17.2
40	CL	CORE			TESTED			CRT		16	159.787	2556.6
41	CL	CORE			TESTED			QZIT		2	117.300	234.6
42	CL	DEBIT						CRT		1	36.200	36.2
43	CL	FLA			DECORT					1	1.100	1.1
44	CL	FLA			DECORT			CRT		95	11.784	1119.5
45	CL	FLA			DECORT			QZIT		6	9.883	59.3
46	CL	FLA			DECORT	RUM		CRT		8	17.337	138.7
47	CL	FLA			INTERIOR			CRT		192	4.201	798.2
48	CL	FLA			INTERIOR			NOV		1	0.200	0.2

APPENDIX D

FUNCTIONAL TYPES

CASTOR RIVER - 23S0496

FTYPE	FIELD1	FIELD2	FIELD3	FIELD32
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	POT	BODY		
DOMESTIC	GRL		PITS	
FABRICATING	GRL		GRIP	
FABRICATING	GRL		GRIP	HAM
FABRICATING	CL	BIFK	PERF	
GENERAL UTILITY	CL	FLA	END	
GENERAL UTILITY	CL	COBTO	CHOP	
GENERAL UTILITY	CL	BIFK	CHOP	
GENERAL UTILITY	GRL	CHNK	POUND	
GENERAL UTILITY	CL	COBTO	CHOP	
GENERAL UTILITY	CL	COBTO	CHOP	
GENERAL UTILITY	CL	COBTO	CHOP	
GENERAL UTILITY	CL	BIFK	SCR	
STONEWORKING	GRL		HAM	
STONEWORKING	CL	COBTO	HAM	
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	CORE		
STONEWORKING	URM	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	GRL		GRIP	HAM
STONEWORKING	CL	BIFK	ST2	
STONEWORKING	CL	CORE		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	CORE		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		

CASTOR RIVER - 23S0496

FTYPE	FIELD1	FIELD2	FIELD3	FIELD32
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	COBTO	HAM	
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	BIFK		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CL	CORE		
STONEWORKING	CG	CORE		
STONEWORKING	CL	CORE		
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK		
WEAPONS	CL	PPK		
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	ARROW	
WEAPONS	CL	PPK		
WEAPONS	CL	PPK	ARROW	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WEAPONS	CL	PPK	DART	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	

CASTOR RIVER - 23S0496

FTYPE	FIELD1	FIELD2	FIELD3	FIELD32
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
WOODWORKING	CL	FLA	SPOKS	
HISTORIC	OHIST		BODY	
HISTORIC	DOM		BOTTLE	

STATISTICS FOR FUNCTIONAL TYPES

	WEIGHT			
	N	SUM	MEAN	STD
FTYPE				
DOMESTIC	8.00	471.20	58.90	160.78
FABRICATING	3.00	261.40	87.13	86.51
GENERAL UTILITY	8.00	1330.00	166.25	169.71
STONEWORKING	66.00	7912.40	119.88	113.51
WEAPONS	15.00	85.80	5.72	3.97
WOODWORKING	13.00	82.80	6.37	6.53
HISTORIC	2.00	8.20	4.10	0.57

STATISTICS FOR FUNCTIONAL TYPES

	COUNT			
	N	SUM	MEAN	STD
FTYPE				
DOMESTIC	8.00	9.00	1.13	0.35
FABRICATING	3.00	3.00	1.00	0.00
GENERAL UTILITY	8.00	8.00	1.00	0.00
STONEWORKING	64.00	82.00	1.28	1.40
WEAPONS	15.00	15.00	1.00	0.00
WOODWORKING	13.00	13.00	1.00	0.00
HISTORIC	2.00	2.00	1.00	0.00

ONE WAY FREQ TABLE FOR FUNCTIONAL TYPES WEIGHTED BY WEIGHT

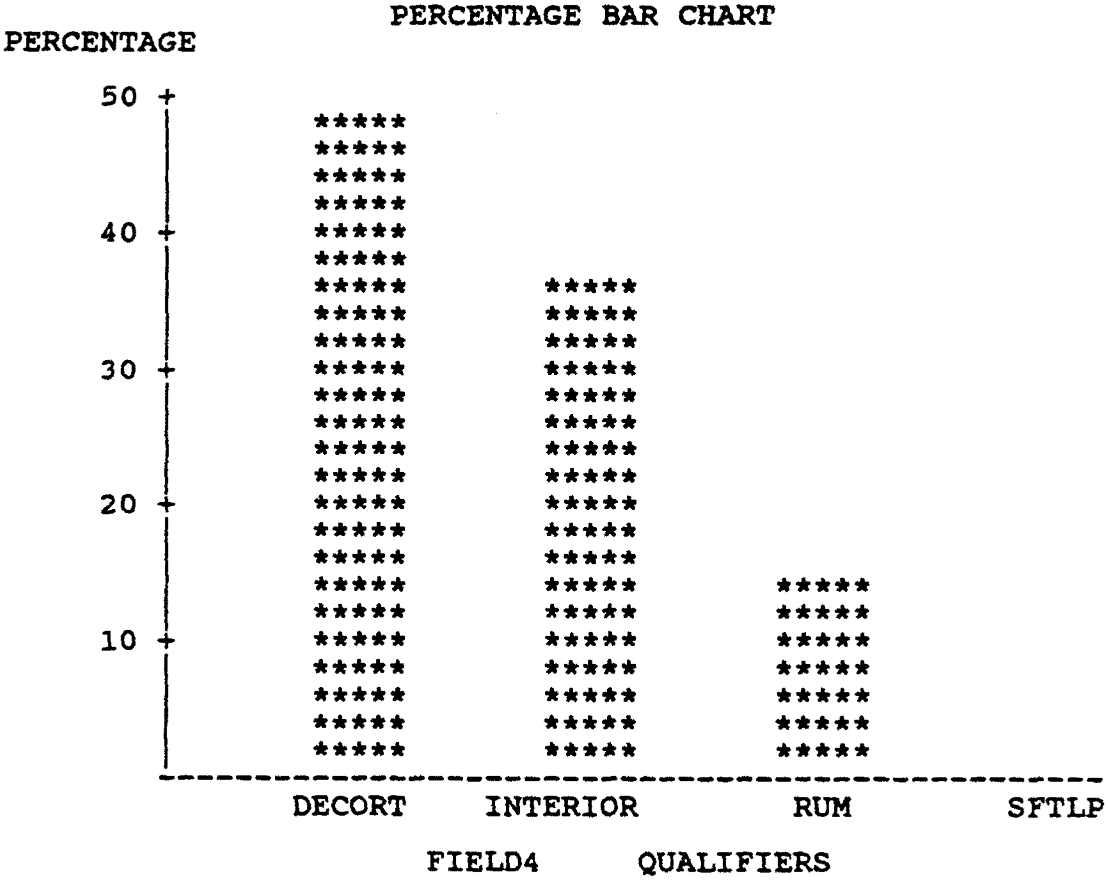
FTYPE	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DOMESTIC	471.2	4.6	471.2	4.6
FABRICATING	261.4	2.6	732.6	7.2
GENERAL UTILITY	1330	13.1	2062.6	20.3
STONEWORKING	7912.4	77.9	9975	98.3
WEAPONS	85.8	0.8	10060.8	99.1
WOODWORKING	82.8	0.8	10143.6	99.9
HISTORIC	8.2	0.1	10151.8	100.0

ONE WAY FREQ TABLE FOR FUNCTIONAL TYPES WEIGHTED BY COUNT

FTYPE	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DOMESTIC	9	6.8	9	6.8
FABRICATING	3	2.3	12	9.1
GENERAL UTILITY	8	6.1	20	15.2
STONEWORKING	82	62.1	102	77.3
WEAPONS	15	11.4	117	88.6
WOODWORKING	13	9.8	130	98.5
HISTORIC	2	1.5	132	100.0

PROPORTION OF QUALIFIERS BY WEIGHT
SPECIFIC MORPHOLOGICAL = FLA

PERCENTAGE BAR CHART



ONE WAY FREQUENCY DISTRIBUTIONS BY WEIGHT

MAJOR ARTIFACT CLASS

FIELD1	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	65613.4	.	.	.
ANIM	0.6	0.0	0.6	0.0
CG	13.5	0.0	14.1	0.0
CL	17655.1	40.9	17669.2	40.9
FLOR	4.5	0.0	17673.7	41.0
DOM	33.3	0.1	17707	41.0
GRL	1541.5	3.6	19248.5	44.6
OHIST	7.7	0.0	19256.2	44.6
POT	14.4	0.0	19270.6	44.7
SHELL	15.6	0.0	19286.2	44.7
URM	23545	54.6	42831.2	99.2
STRUCT	307.7	0.7	43138.9	100.0
FOSSIL	16	0.0	43154.9	100.0

SPECIFIC MORPHOLOGICAL

FIELD2	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	88091.1	.	.	.
BIFK	334.6	1.6	334.6	1.6
BODY	14.4	0.1	349	1.7
CHNK	1274.2	6.2	1623.2	7.9
COBL	4101.3	19.8	5724.5	27.7
COBTO	1763.4	8.5	7487.9	36.2
CORE	6798.1	32.9	14286	69.1
DEBIT	36.2	0.2	14322.2	69.3
FLA	2924.5	14.1	17246.7	83.4
FOODPREP	9.5	0.0	17256.2	83.5
HARDW	210.9	1.0	17467.1	84.5
PEBL	260.1	1.3	17727.2	85.7
PPK	85.8	0.4	17813	86.1
SHAT	2860	13.8	20673	100.0
SUBS	4.2	0.0	20677.2	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY WEIGHT

MORPHOFUNCTIONAL

FIELD3	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	105404	.	.	.
ARROW	1.5	0.0	1.5	0.0
BASE	2.7	0.1	4.2	0.1
BODY	4.5	0.1	8.7	0.3
BOLT	112.3	3.3	121	3.6
BOTTLE	3.7	0.1	124.7	3.7
CHOP	839.9	25.0	964.6	28.7
DART	74.7	2.2	1039.3	30.9
END	1	0.0	1040.3	30.9
GRIP	233.6	6.9	1273.9	37.9
HAM	803.8	23.9	2077.7	61.8
NAIL	54.7	1.6	2132.4	63.4
NUTBOLT	140.7	4.2	2273.1	67.6
PERF	27.8	0.8	2300.9	68.4
PITS	456.8	13.6	2757.7	82.0
PLATE	5.3	0.2	2763	82.1
POUND	453.1	13.5	3216.1	95.6
SCR	36	1.1	3252.1	96.7
SPOKS	82.8	2.5	3334.9	99.1
ST2	29.4	0.9	3364.3	100.0

FIELD32	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108582	.	.	.
HAM	186.4	100.0	186.4	100.0

QUALIFIERS

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	13419.5	.	.	.
CLEAR	10.9	0.0	10.9	0.0
CNTRST	12.3	0.0	23.2	0.0
CORDMARK	4.7	0.0	27.9	0.0
DECORT	1542.3	1.6	1570.2	1.6
EXPNST	11.9	0.0	1582.1	1.7
G	65424.9	68.6	67007	70.3
GREEN	1	0.0	67008	70.3
INTERIOR	1113.5	1.2	68121.5	71.4
L	6.5	0.0	68128	71.5
LESS	20828.4	21.8	88956.4	93.3
MOLD	4	0.0	88960.4	93.3
PLAIN	4.3	0.0	88964.7	93.3
POLISH	64.4	0.1	89029.1	93.4
RUM	479.1	0.5	89508.2	93.9
SFTLP	11.3	0.0	89519.5	93.9
SIDENT	1	0.0	89520.5	93.9
SLIP	3	0.0	89523.5	93.9
STL	16	0.0	89539.5	93.9
TESTED	5809.3	6.1	95348.8	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY WEIGHT

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108429	.	.	.
DECORT	182.4	53.7	182.4	53.7
RUM	142.7	42.0	325.1	95.7
SFTLP	2.6	0.8	327.7	96.5
VEXBS	11.9	3.5	339.6	100.0

FIELD43	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108756	.	.	.
CORNT	11.9	100.0	11.9	100.0

RAW MATERIAL

FIELD5	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	19450.9	.	.	.
BONE	0.6	0.0	0.6	0.0
COAL	4.8	0.0	5.4	0.0
CONG	141.4	0.2	146.8	0.2
CORNCOB	4.2	0.0	151	0.2
CRT	81288.9	91.0	81439.9	91.2
EARTHW	2.7	0.0	81442.6	91.2
FERS	96.8	0.1	81539.4	91.3
GLASS	29.3	0.0	81568.7	91.3
GRAPH	2.2	0.0	81570.9	91.3
GROG	1	0.0	81571.9	91.3
HEM	1.1	0.0	81573	91.3
IG	12	0.0	81585	91.3
METAL	210.9	0.2	81795.9	91.6
NOV	0.2	0.0	81796.1	91.6
OQZ	324.8	0.4	82120.9	91.9
PEARLW	1.3	0.0	82122.2	91.9
PITK	61.1	0.1	82183.3	92.0
QTZ	548	0.6	82731.3	92.6
QXL	146.7	0.2	82878	92.8
QZIT	5548.7	6.2	88426.7	99.0
SAND	13.4	0.0	88440.1	99.0
SS	871.8	1.0	89311.9	100.0
WHITEW	5.5	0.0	89317.4	100.0

FIELD52	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	108735	.	.	.
CRT	15.3	46.4	15.3	46.4
QZIT	17.7	53.6	33	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY WEIGHT

PART OF SPECIMEN PRESERVED

PART	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	108574	.	.	.
DS	18.3	9.4	18.3	9.4
PX	4.5	2.3	22.8	11.7
FR	171.8	88.3	194.6	100.0

CONDITION OF ARTIFACT

CONDITN	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	26864.3	.	.	.
FC	81883	100.0	81883	100.0
HT	1	0.0	81884	100.0
CTX	20	0.0	81904	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY COUNT

MAJOR ARTIFACT CLASS

FIELD1	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	2	.	.	.
ANIM	1	0.1	1	0.1
CG	1	0.1	2	0.2
CL	1115	84.5	1117	84.7
FLOR	2	0.2	1119	84.8
DOM	6	0.5	1125	85.3
GRL	5	0.4	1130	85.7
OHIST	3	0.2	1133	85.9
POT	8	0.6	1141	86.5
SHELL	3	0.2	1144	86.7
URM	164	12.4	1308	99.2
STRUCT	10	0.8	1318	99.9
FOSSIL	1	0.1	1319	100.0

SPECIFIC MORPHOLOGICAL

FIELD2	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	178	.	.	.
BIFK	10	0.9	10	0.9
BODY	8	0.7	18	1.6
CHNK	7	0.6	25	2.2
COBL	18	1.6	43	3.8
COBTO	13	1.1	56	4.9
CORE	71	6.2	127	11.1
DEBIT	2	0.2	129	11.3
FLA	830	72.6	959	83.9
FOODPREP	4	0.3	963	84.3
HARDW	5	0.4	968	84.7
PEBL	5	0.4	973	85.1
PPK	15	1.3	988	86.4
SHAT	154	13.5	1142	99.9
SUBS	1	0.1	1143	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY COUNT

MORPHOFUNCTIONAL

FIELD3	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1265	.	.	.
ARROW	2	3.6	2	3.6
BASE	1	1.8	3	5.4
BODY	1	1.8	4	7.1
BOLT	6	10.7	10	17.9
BOTTLE	1	1.8	11	19.6
CHOP	5	8.9	16	28.6
DART	10	17.9	26	46.4
END	1	1.8	27	48.2
GRIP	2	3.6	29	51.8
HAM	3	5.4	32	57.1
NAIL	3	5.4	35	62.5
NUTBOLT	1	1.8	36	64.3
PERF	1	1.8	37	66.1
PITS	1	1.8	38	67.9
PLATE	2	3.6	40	71.4
POUND	1	1.8	41	73.2
SCR	1	1.8	42	75.0
SPOKS	13	23.2	55	98.2
ST2	1	1.8	56	100.0

FIELD32	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1320	.	.	.
HAM	1	100.0	1	100.0

QUALIFIERS

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	343	.	.	.
CLEAR	3	0.3	3	0.3
CNTRST	2	0.2	5	0.5
CORDMARK	1	0.1	6	0.6
DECORT	184	18.8	190	19.4
EXPNST	1	0.1	191	19.5
G	78	8.0	269	27.5
GREEN	1	0.1	270	27.6
INTERIOR	570	58.3	840	85.9
LESS	5	0.5	845	86.4
MOLD	1	0.1	846	86.5
PLAIN	2	0.2	848	86.7
POLISH	3	0.3	851	87.0
RUM	74	7.6	925	94.6
SFTLP	5	0.5	930	95.1
SIDENT	1	0.1	931	95.2
SLIP	4	0.4	935	95.6
STL	1	0.1	936	95.7
TESTED	42	4.3	978	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY COUNT

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1285	.	.	.
DECORT	20	55.6	20	55.6
RUM	13	36.1	33	91.7
SFTLP	2	5.6	35	97.2
VEXBS	1	2.8	36	100.0

FIELD43	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1320	.	.	.
CORNT	1	100.0	1	100.0

RAW MATERIAL

FIELD5	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	8	.	.	.
BONE	1	0.1	1	0.1
COAL	2	0.2	3	0.2
CONG	2	0.2	5	0.4
CORNCOB	1	0.1	6	0.5
CRT	1204	91.7	1210	92.2
EARTHW	1	0.1	1211	92.2
FERS	5	0.4	1216	92.6
GLASS	4	0.3	1220	92.9
GRAPH	1	0.1	1221	93.0
GROG	1	0.1	1222	93.1
METAL	5	0.4	1227	93.5
NOV	2	0.2	1229	93.6
OQZ	13	1.0	1242	94.6
PEARLW	1	0.1	1243	94.7
PITK	8	0.6	1251	95.3
QTZ	6	0.5	1257	95.7
QXL	1	0.1	1258	95.8
QZIT	46	3.5	1304	99.3
SAND	7	0.5	1311	99.8
WHITEW	2	0.2	1313	100.0

FIELD52	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	1319	.	.	.
QZIT	2	100.0	2	100.0

ONE WAY FREQUENCY DISTRIBUTIONS BY COUNT

PART OF SPECIMEN PRESERVED

PART	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	1316	.	.	.
DS	2	40.0	2	40.0
PX	1	20.0	3	60.0
FR	2	40.0	5	100.0

CONDITION OF ARTIFACT

CONDITN	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
.	1061	.	.	.
FC	258	99.2	258	99.2
HT	1	0.4	259	99.6
CTX	1	0.4	260	100.0

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
MAJOR ARTIFACT CLASS				
.	601.00	65613.40	109.17	149.50
ANIM	1.00	0.60	0.60	.
CG	1.00	13.50	13.50	.
CL	626.00	17655.10	28.20	59.52
FLOR	2.00	4.50	2.25	2.76
DOM	6.00	33.30	5.55	7.21
GRL	5.00	1541.50	308.30	183.10
OHIST	3.00	7.70	2.57	1.78
POT	7.00	14.40	2.06	1.84
SHELL	3.00	15.60	5.20	1.71
URM	191.00	23545.00	123.27	171.17
STRUCT	6.00	307.70	51.28	56.26
FOSSIL	1.00	16.00	16.00	.
SPECIFIC MORPHOLOGICAL				
	784.00	88091.10	112.36	155.66
BIFK	10.00	334.60	33.46	41.30
BODY	7.00	14.40	2.06	1.84
CHNK	9.00	1274.20	141.58	142.62
COBL	25.00	4101.30	164.05	112.28
COBTO	13.00	1763.40	135.65	123.85
CORE	55.00	6798.10	123.60	109.39
DEBIT	1.00	36.20	36.20	.
FLA	412.00	2924.50	7.10	10.71

(CONTINUED)

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
SPECIFIC MORPHOLOGICAL				
FOODPREP	4.00	9.50	2.37	1.25
HARDW	5.00	210.90	42.18	57.75
PEBL	11.00	260.10	23.65	25.67
PPK	15.00	85.80	5.72	3.97
SHAT	101.00	2860.00	28.32	29.33
SUBS	1.00	4.20	4.20	.
MORPHOFUNCTIONAL				
	1401.00	105404.00	75.23	129.56
ARROW	2.00	1.50	0.75	0.35
BASE	1.00	2.70	2.70	.
BODY	1.00	4.50	4.50	.
BOLT	2.00	112.30	56.15	57.49
BOTTLE	1.00	3.70	3.70	.
CHOP	5.00	839.90	167.98	136.96
DART	10.00	74.70	7.47	3.67
END	1.00	1.00	1.00	.
GRIP	2.00	233.60	116.80	98.43
HAM	3.00	803.80	267.93	152.57
NAIL	3.00	54.70	18.23	24.51
NUTBOLT	1.00	140.70	140.70	.
PERF	1.00	27.80	27.80	.
PITS	1.00	456.80	456.80	.
PLATE	2.00	5.30	2.65	1.91

(CONTINUED)

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
MORPHOFUNCTIONAL				
POUND	1.00	453.10	453.10	.
SCR	1.00	36.00	36.00	.
SPOKS	13.00	82.80	6.37	6.53
ST2	1.00	29.40	29.40	.
FIELD32				
	1452.00	108581.90	74.78	129.26
HAM	1.00	186.40	186.40	.
QUALIFIERS				
	225.00	13419.50	59.64	92.74
CLEAR	3.00	10.90	3.63	0.90
CNTRST	2.00	12.30	6.15	1.91
CORDMARK	1.00	4.70	4.70	.
DECORT	118.00	1542.30	13.07	17.68
EXPNST	1.00	11.90	11.90	.
G	336.00	65424.90	194.72	192.25
GREEN	1.00	1.00	1.00	.
INTERIOR	233.00	1113.50	4.78	7.99
L	1.00	6.50	6.50	.
LESS	418.00	20828.40	49.83	73.26
MOLD	1.00	4.00	4.00	.
PLAIN	1.00	4.30	4.30	.
POLISH	3.00	64.40	21.47	15.96
RUM	58.00	479.10	8.26	9.99
SFTLP	5.00	11.30	2.26	3.67

(CONTINUED)

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
QUALIFIERS				
SIDENT	1.00	1.00	1.00	.
SLIP	4.00	3.00	0.75	0.48
STL	1.00	16.00	16.00	.
TESTED	40.00	5809.30	145.23	93.40
FIELD42				
	1425.00	108428.70	76.09	130.20
DECORT	16.00	182.40	11.40	7.45
RUM	9.00	142.70	15.86	18.42
SFTLP	2.00	2.60	1.30	1.56
VEXBS	1.00	11.90	11.90	.
FIELD43				
	1452.00	108756.40	74.90	129.28
CORNT	1.00	11.90	11.90	.
RAW MATERIAL				
	128.00	19450.90	151.96	168.44
BONE	1.00	0.60	0.60	.
COAL	2.00	4.80	2.40	0.00
CONG	2.00	141.40	70.70	71.70
CORNCOB	1.00	4.20	4.20	.
CRT	1147.00	81288.90	70.87	125.98
EARTHW	1.00	2.70	2.70	.
FERS	1.00	96.80	96.80	.
GLASS	4.00	29.30	7.32	8.65
GRAPH	1.00	2.20	2.20	.

(CONTINUED)

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
RAW MATERIAL				
GROG	1.00	1.00	1.00	.
HEM	1.00	1.10	1.10	.
IG	1.00	12.00	12.00	.
METAL	5.00	210.90	42.18	57.75
NOV	1.00	0.20	0.20	.
OQZ	23.00	324.80	14.12	15.49
PEARLW	1.00	1.30	1.30	.
PITK	8.00	61.10	7.64	12.22
QTZ	8.00	548.00	68.50	158.46
QXL	1.00	146.70	146.70	.
QZIT	88.00	5548.70	63.05	109.66
SAND	6.00	13.40	2.23	1.95
SS	19.00	871.80	45.88	94.05
WHITEW	2.00	5.50	2.75	1.77
FIELD52				
	1449.00	108735.30	75.04	129.38
CRT	2.00	15.30	7.65	4.45
QZIT	2.00	17.70	8.85	9.83
PART OF SPECIMEN PRESERVED				
.	1448.00	108573.70	74.98	129.41
DS	2.00	18.30	9.15	8.70
PX	1.00	4.50	4.50	.
FR	2.00	171.80	85.90	85.98

(CONTINUED)

STATISTICAL TABLES FOR WEIGHT

	WEIGHT			
	N	SUM	MEAN	STD
CONDITION OF ARTIFACT				
.	663.00	26864.30	40.52	99.44
FC	788.00	81883.00	103.91	143.71
HT	1.00	1.00	1.00	.
CTX	1.00	20.00	20.00	.

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
MAJOR ARTIFACT CLASS				
.	2.00	2.00	1.00	0.00
ANIM	1.00	1.00	1.00	.
CG	1.00	1.00	1.00	.
CL	624.00	1115.00	1.79	1.92
FLOR	2.00	2.00	1.00	0.00
DOM	6.00	6.00	1.00	0.00
GRL	5.00	5.00	1.00	0.00
OHIST	3.00	3.00	1.00	0.00
POT	7.00	8.00	1.14	0.38
SHELL	3.00	3.00	1.00	0.00
URM	17.00	164.00	9.65	23.11
STRUCT	6.00	10.00	1.67	1.63
FOSSIL	1.00	1.00	1.00	.
SPECIFIC MORPHOLOGICAL				
	28.00	178.00	6.36	18.29
BIFK	10.00	10.00	1.00	0.00
BODY	7.00	8.00	1.14	0.38
CHNK	7.00	7.00	1.00	0.00
COBL	17.00	18.00	1.06	0.24
COBTO	13.00	13.00	1.00	0.00
CORE	53.00	71.00	1.34	1.53
DEBIT	1.00	2.00	2.00	.
FLA	409.00	830.00	2.03	2.23

(CONTINUED)

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
SPECIFIC MORPHOLOGICAL				
FOODPREP	4.00	4.00	1.00	0.00
HARDW	5.00	5.00	1.00	0.00
PEBL	5.00	5.00	1.00	0.00
PPK	15.00	15.00	1.00	0.00
SHAT	103.00	154.00	1.50	0.80
SUBS	1.00	1.00	1.00	.
MORPHOFUNCTIONAL				
	626.00	1265.00	2.02	4.35
ARROW	2.00	2.00	1.00	0.00
BASE	1.00	1.00	1.00	.
BODY	1.00	1.00	1.00	.
BOLT	2.00	6.00	3.00	2.83
BOTTLE	1.00	1.00	1.00	.
CHOP	5.00	5.00	1.00	0.00
DART	10.00	10.00	1.00	0.00
END	1.00	1.00	1.00	.
GRIP	2.00	2.00	1.00	0.00
HAM	3.00	3.00	1.00	0.00
NAIL	3.00	3.00	1.00	0.00
NUTBOLT	1.00	1.00	1.00	.
PERF	1.00	1.00	1.00	.
PITS	1.00	1.00	1.00	.
PLATE	2.00	2.00	1.00	0.00

(CONTINUED)

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
MORPHOFUNCTIONAL				
POUND	1.00	1.00	1.00	.
SCR	1.00	1.00	1.00	.
SPOKS	13.00	13.00	1.00	0.00
ST2	1.00	1.00	1.00	.
FIELD32				
	677.00	1320.00	1.95	4.20
HAM	1.00	1.00	1.00	.
QUALIFIERS				
	200.00	343.00	1.71	5.03
CLEAR	3.00	3.00	1.00	0.00
CNTRST	2.00	2.00	1.00	0.00
CORDMARK	1.00	1.00	1.00	.
DECORT	117.00	184.00	1.57	0.93
EXPNST	1.00	1.00	1.00	.
G	5.00	78.00	15.60	31.00
GREEN	1.00	1.00	1.00	.
INTERIOR	232.00	570.00	2.46	2.79
L	0.00	.	.	.
LESS	2.00	5.00	2.50	2.12
MOLD	1.00	1.00	1.00	.
PLAIN	1.00	2.00	2.00	.
POLISH	3.00	3.00	1.00	0.00
RUM	58.00	74.00	1.28	0.67
SFTLP	5.00	5.00	1.00	0.00

(CONTINUED)

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
QUALIFIERS				
SIDENT	1.00	1.00	1.00	.
SLIP	4.00	4.00	1.00	0.00
STL	1.00	1.00	1.00	.
TESTED	40.00	42.00	1.05	0.22
FIELD42				
	651.00	1285.00	1.97	4.28
DECORT	15.00	20.00	1.33	0.49
RUM	9.00	13.00	1.44	0.73
SFTLP	2.00	2.00	1.00	0.00
VEXBS	1.00	1.00	1.00	.
FIELD43				
	677.00	1320.00	1.95	4.20
CORNT	1.00	1.00	1.00	.
RAW MATERIAL				
	7.00	8.00	1.14	0.38
BONE	1.00	1.00	1.00	.
COAL	2.00	2.00	1.00	0.00
CONG	2.00	2.00	1.00	0.00
CORNCOB	1.00	1.00	1.00	.
CRT	576.00	1204.00	2.09	4.53
EARTHW	1.00	1.00	1.00	.
FERS	1.00	5.00	5.00	.
GLASS	4.00	4.00	1.00	0.00
GRAPH	1.00	1.00	1.00	.

(CONTINUED)

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
RAW MATERIAL				
GROG	1.00	1.00	1.00	.
HEM	0.00	.	.	.
IG	0.00	.	.	.
METAL	5.00	5.00	1.00	0.00
NOV	1.00	2.00	2.00	.
OQZ	13.00	13.00	1.00	0.00
PEARLW	1.00	1.00	1.00	.
PITK	7.00	8.00	1.14	0.38
QTZ	6.00	6.00	1.00	0.00
QXL	1.00	1.00	1.00	.
QZIT	39.00	46.00	1.18	0.39
SAND	6.00	7.00	1.17	0.41
SS	0.00	.	.	.
WHITEW	2.00	2.00	1.00	0.00
FIELD52				
	676.00	1319.00	1.95	4.20
CRT	0.00	.	.	.
QZIT	2.00	2.00	1.00	0.00
PART OF SPECIMEN PRESERVED				
.	673.00	1316.00	1.96	4.21
DS	2.00	2.00	1.00	0.00
PX	1.00	1.00	1.00	.
FR	2.00	2.00	1.00	0.00

(CONTINUED)

STATISTICAL TABLES FOR COUNT

	COUNT			
	N	SUM	MEAN	STD
CONDITION OF ARTIFACT				
.	584.00	1061.00	1.82	1.98
FC	92.00	258.00	2.80	10.24
HT	1.00	1.00	1.00	.
CTX	1.00	1.00	1.00	.

ONE WAY FREQUENCY DISTRIBUTIONS, SPECIFIC MORPHOLOGICAL=FLA
DATA WEIGHTED BY COUNT

QUALIFIERS

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DECORT	179	21.6	179	21.6
INTERIOR	570	68.7	749	90.2
POLISH	1	0.1	750	90.4
RUM	71	8.6	821	98.9
SFTLP	5	0.6	826	99.5
SLIP	4	0.5	830	100.0

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	795	.	.	.
DECORT	20	57.1	20	57.1
RUM	13	37.1	33	94.3
SFTLP	2	5.7	35	100.0

ONE WAY FREQUENCY DISTRIBUTIONS, SPECIFIC MORPHOLOGICAL=FLA
DATA WEIGHTED BY WEIGHT

QUALIFIERS

FIELD4	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
DECORT	1366.8	46.7	1366.8	46.7
INTERIOR	1113.5	38.1	2480.3	84.8
POLISH	4	0.1	2484.3	84.9
RUM	425.9	14.6	2910.2	99.5
SFTLP	11.3	0.4	2921.5	99.9
SLIP	3	0.1	2924.5	100.0

FIELD42	FREQUENCY	PERCENT	CUMULATIVE FREQUENCY	CUMULATIVE PERCENT
	2596.8	.	.	.
DECORT	182.4	55.7	182.4	55.7
RUM	142.7	43.5	325.1	99.2
SFTLP	2.6	0.8	327.7	100.0

STATISTICAL INFORMATION, SPECIFIC MORPHOLOGICAL=FLA

	WEIGHT			
	N	SUM	MEAN	STD
QUALIFIERS				
DECORT	113.00	1366.80	12.10	14.38
INTERIOR	233.00	1113.50	4.78	7.99
POLISH	1.00	4.00	4.00	.
RUM	56.00	425.90	7.61	9.35
SFTLP	5.00	11.30	2.26	3.67
SLIP	4.00	3.00	0.75	0.48
FIELD42				
	385.00	2596.80	6.74	10.52
DECORT	16.00	182.40	11.40	7.45
RUM	9.00	142.70	15.86	18.42
SFTLP	2.00	2.60	1.30	1.56

STATISTICAL INFORMATION, SPECIFIC MORPHOLOGICAL=FLA

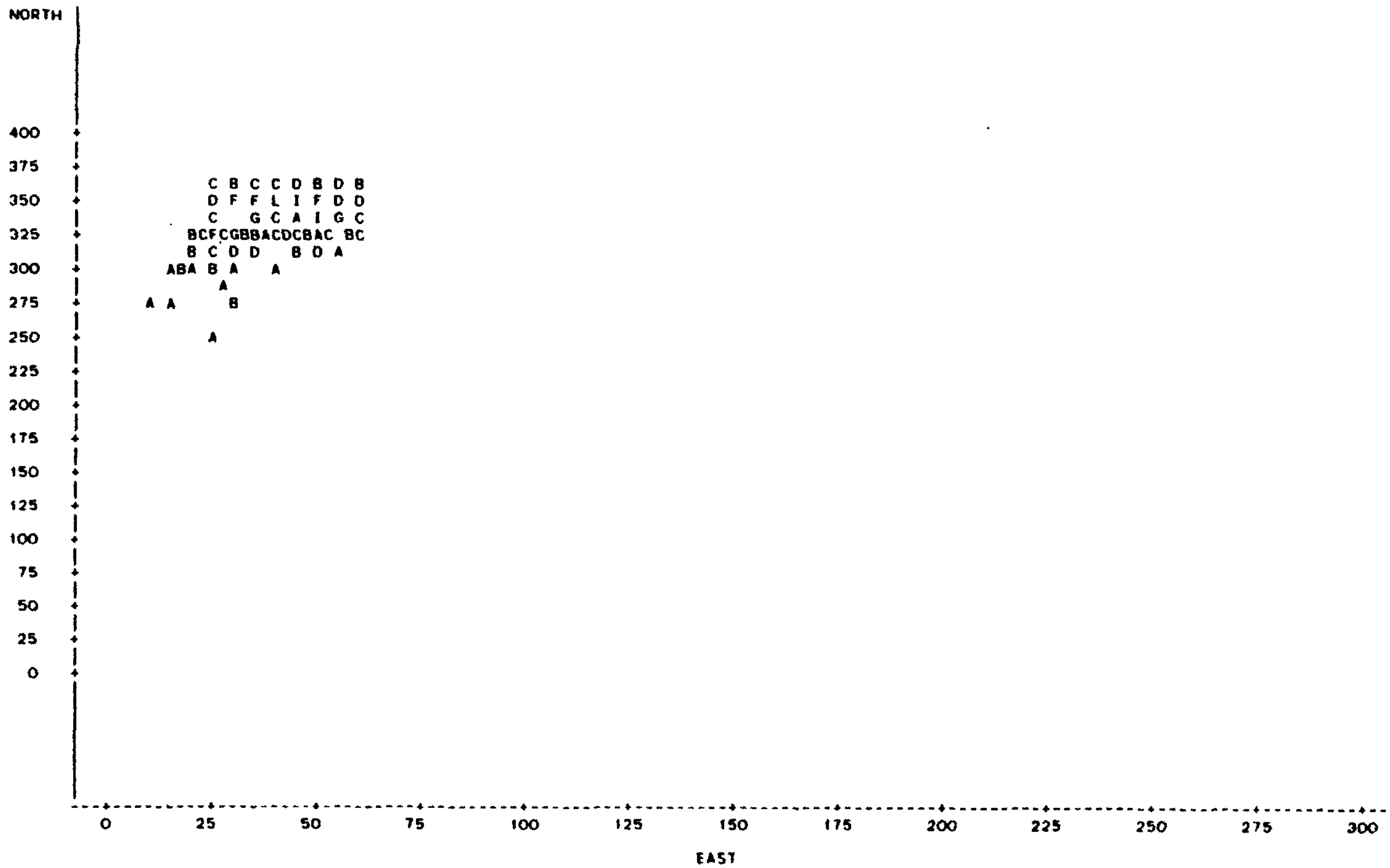
	COUNT			
	N	SUM	MEAN	STD
QUALIFIERS				
DECORT	112.00	179.00	1.60	0.94
INTERIOR	232.00	570.00	2.46	2.79
POLISH	1.00	1.00	1.00	.
RUM	55.00	71.00	1.29	0.69
SFTLP	5.00	5.00	1.00	0.00
SLIP	4.00	4.00	1.00	0.00
FIELD42				
	383.00	795.00	2.08	2.29
DECORT	15.00	20.00	1.33	0.49
RUM	9.00	13.00	1.44	0.73
SFTLP	2.00	2.00	1.00	0.00

APPENDIX E

ARTIFACT PLOTS

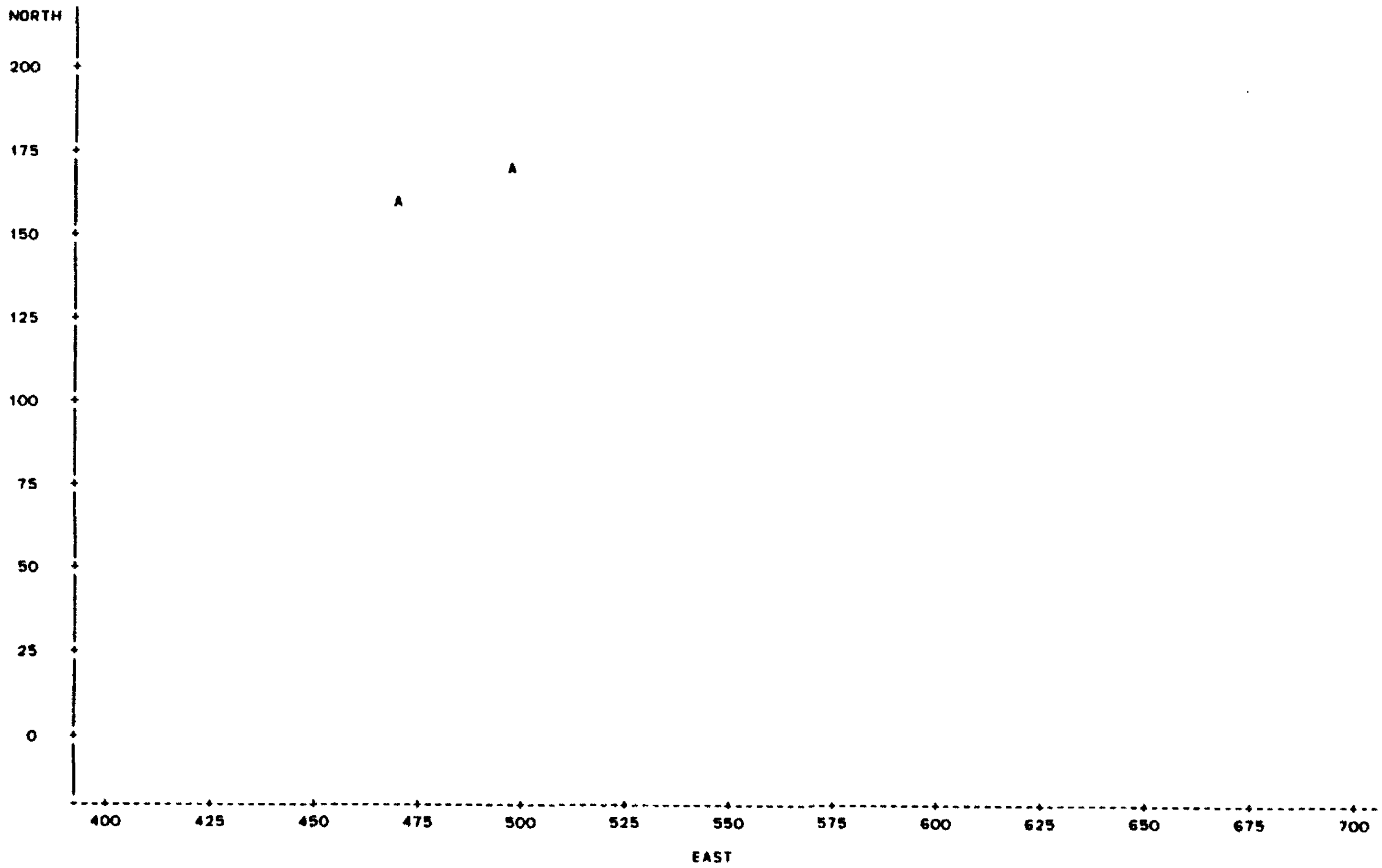
PLOT OF LOCATION COORDINATES, WEST BLOCK
MAJOR ARTIFACT CLASS = URM

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



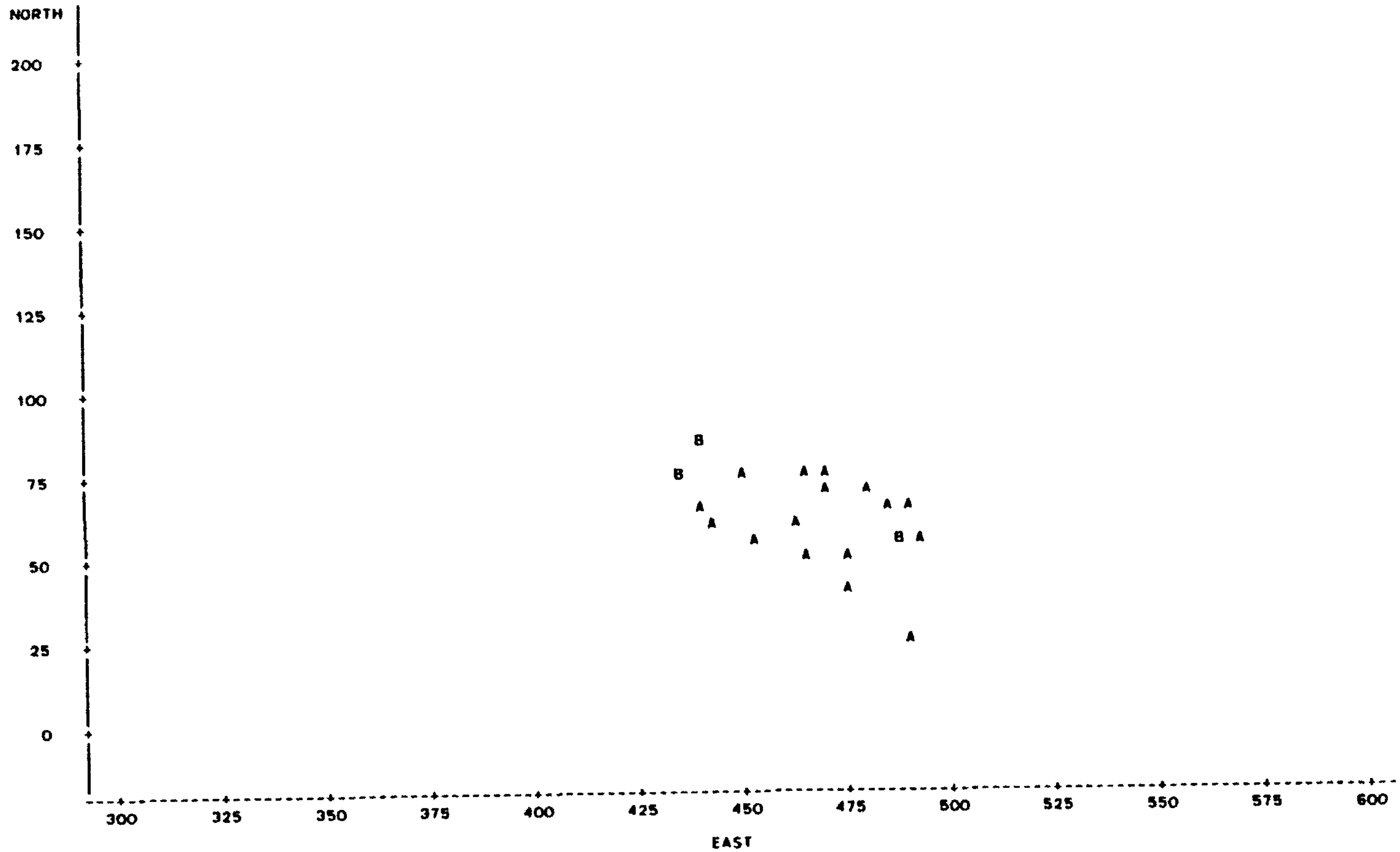
PLOT OF LOCATION COORDINATES, EAST BLOCK
MAJOR ARTIFACT CLASS = URM

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



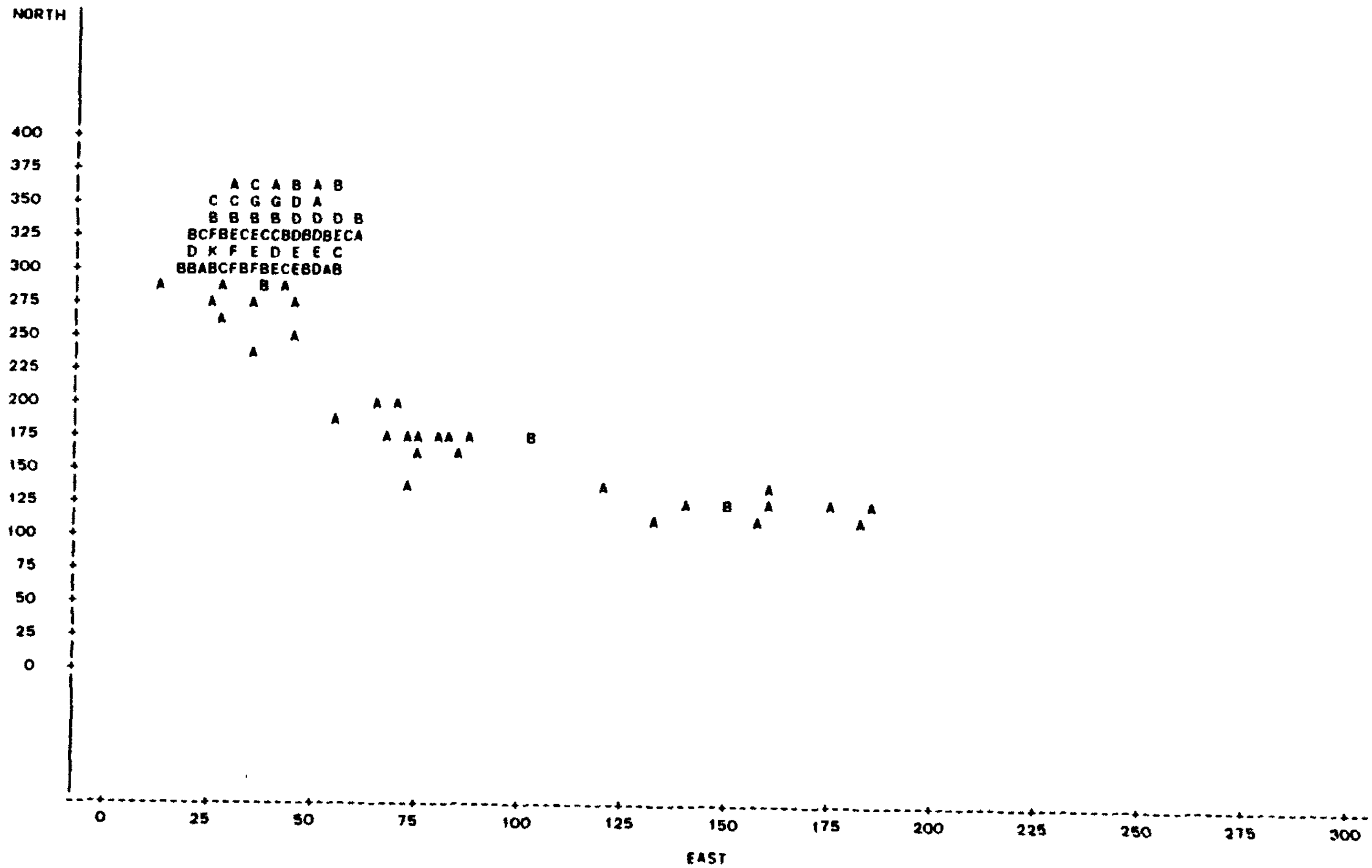
PLOT OF LOCATION COORDINATES, CENTRAL BLOCK
SPECIFIC MORPHOLOGICAL = FLA

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



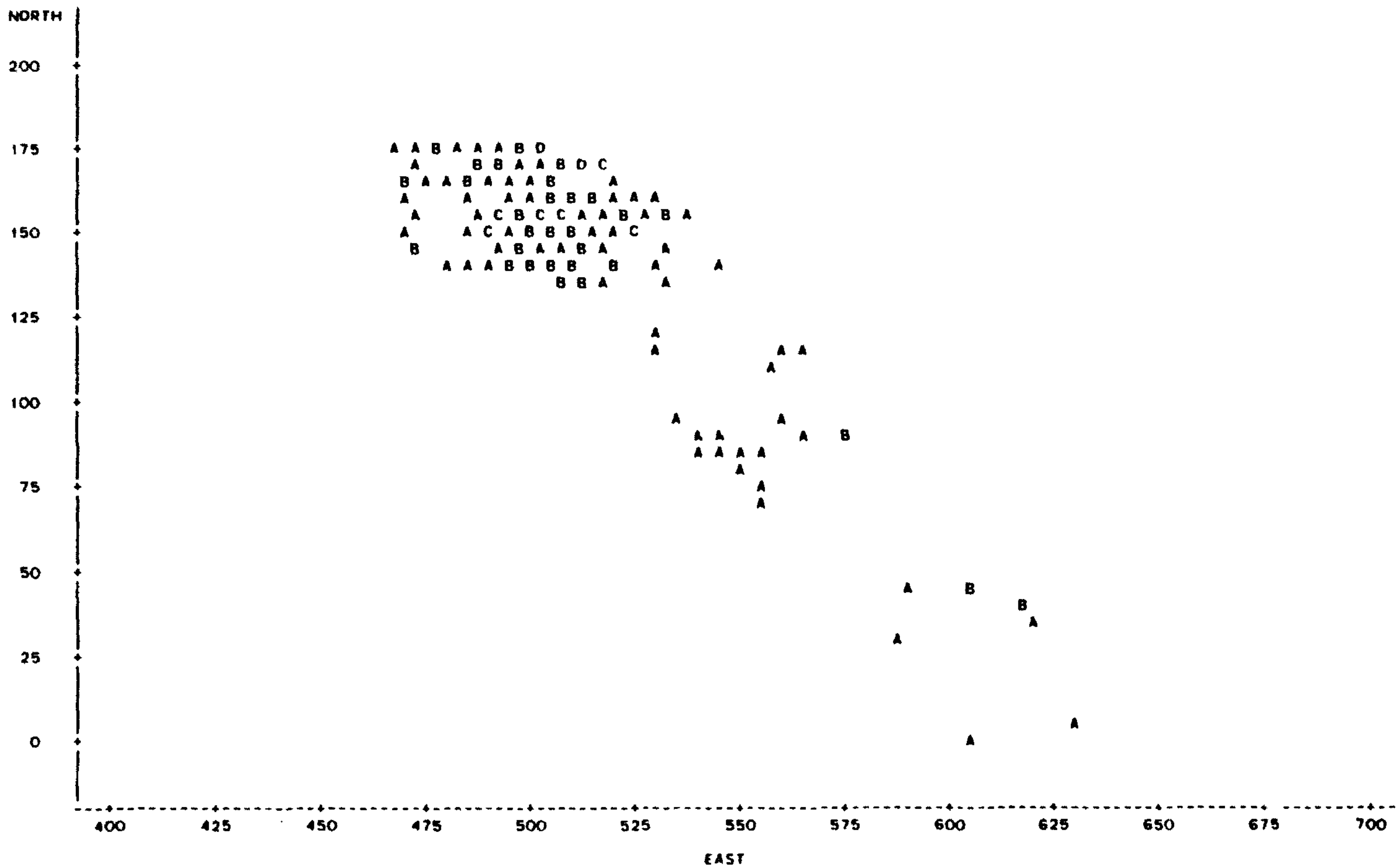
PLOT OF LOCATION COORDINATES, WEST BLOCK
SPECIFIC MORPHOLOGICAL = FLA

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



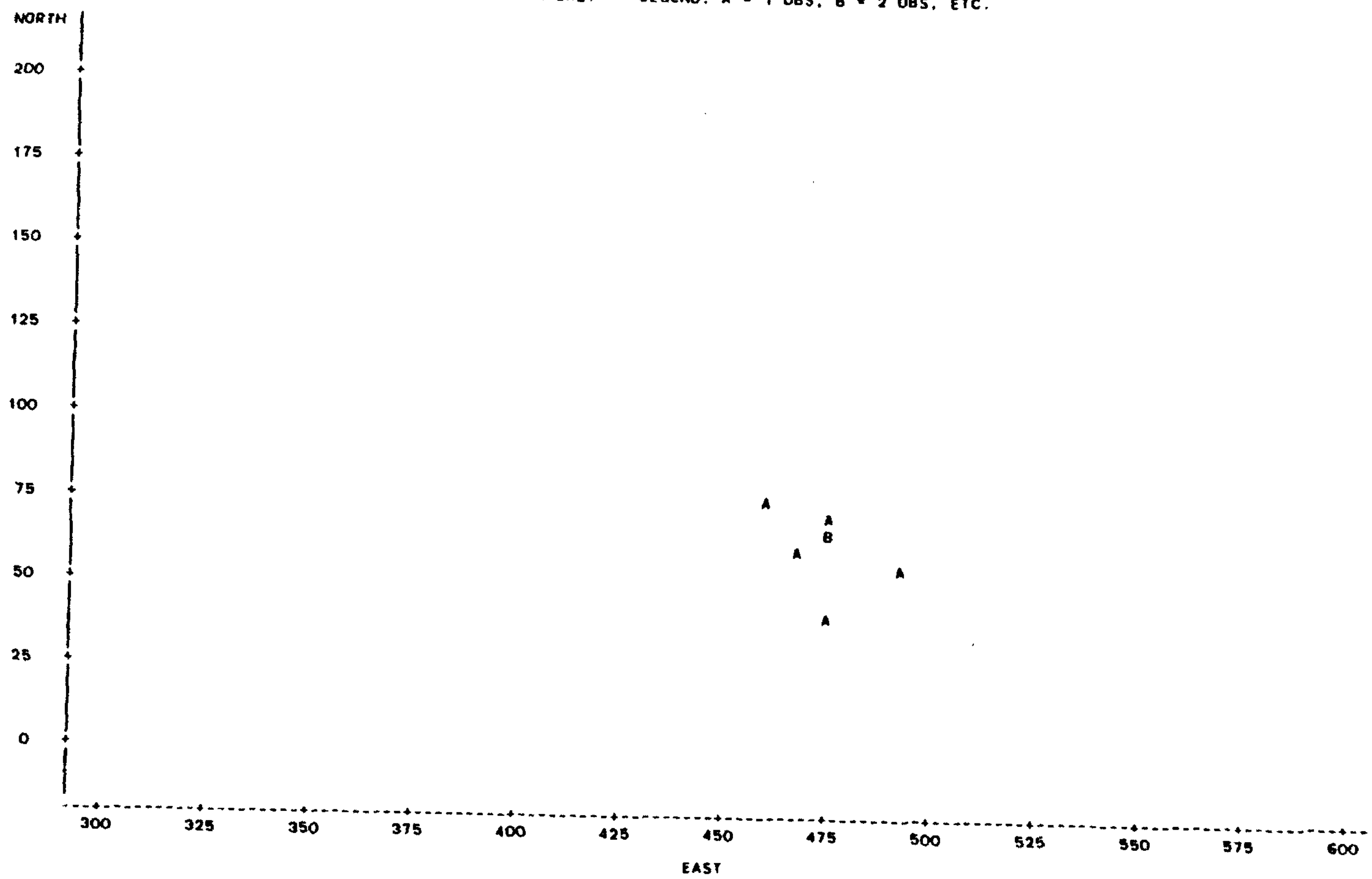
PLOT OF LOCATION COORDINATES, EAST BLOCK
SPECIFIC MORPHOLOGICAL = FLA

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



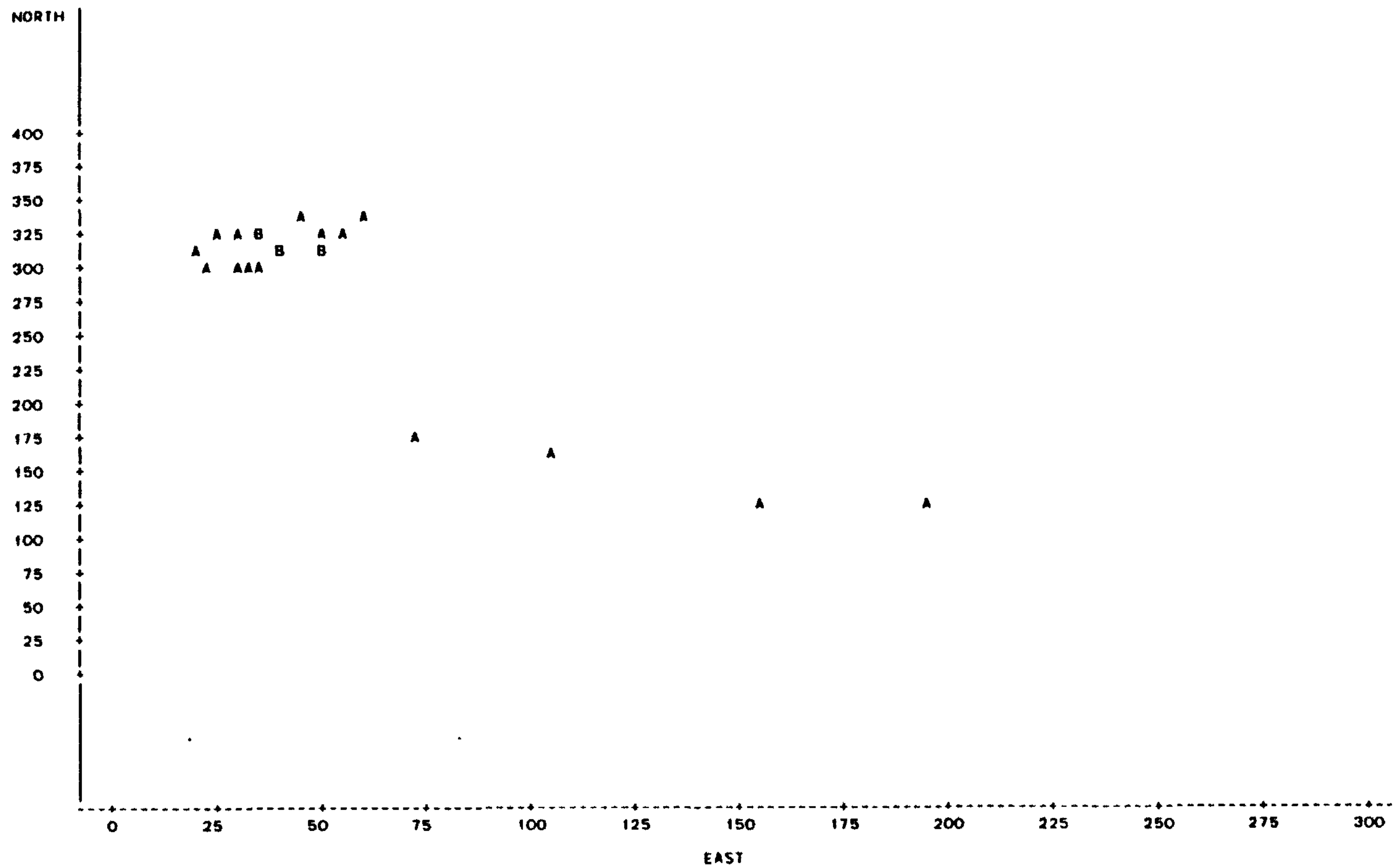
PLOT OF LOCATION COORDINATES, CENTRAL BLOCK
SPECIFIC MORPHOLOGICAL = CORE

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



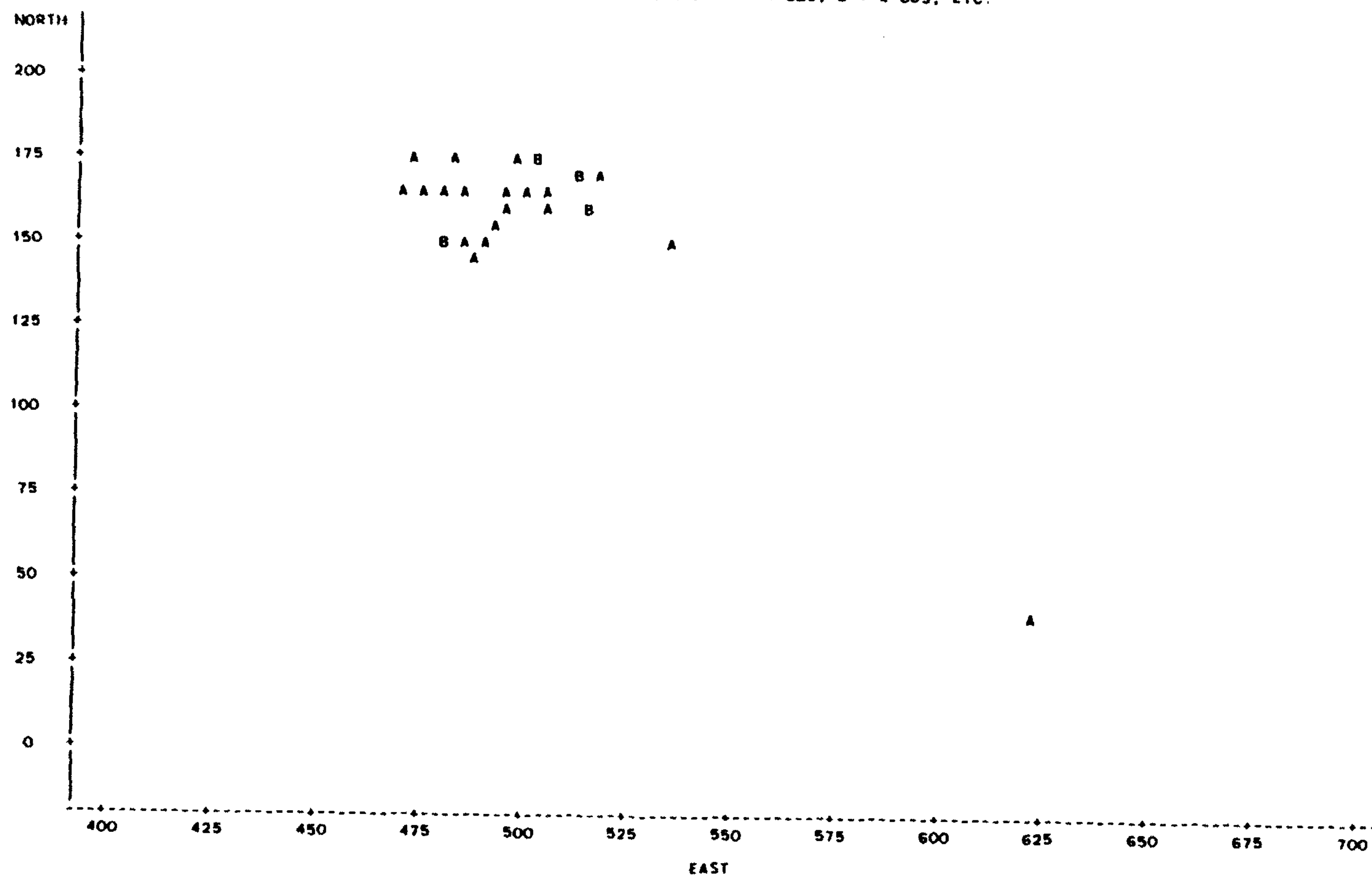
PLOT OF LOCATION COORDINATES, WEST BLOCK
SPECIFIC MORPHOLOGICAL = CORE

PLOT OF NORTH*EAST LEGEND: A = 1 OBS, B = 2 OBS, ETC.



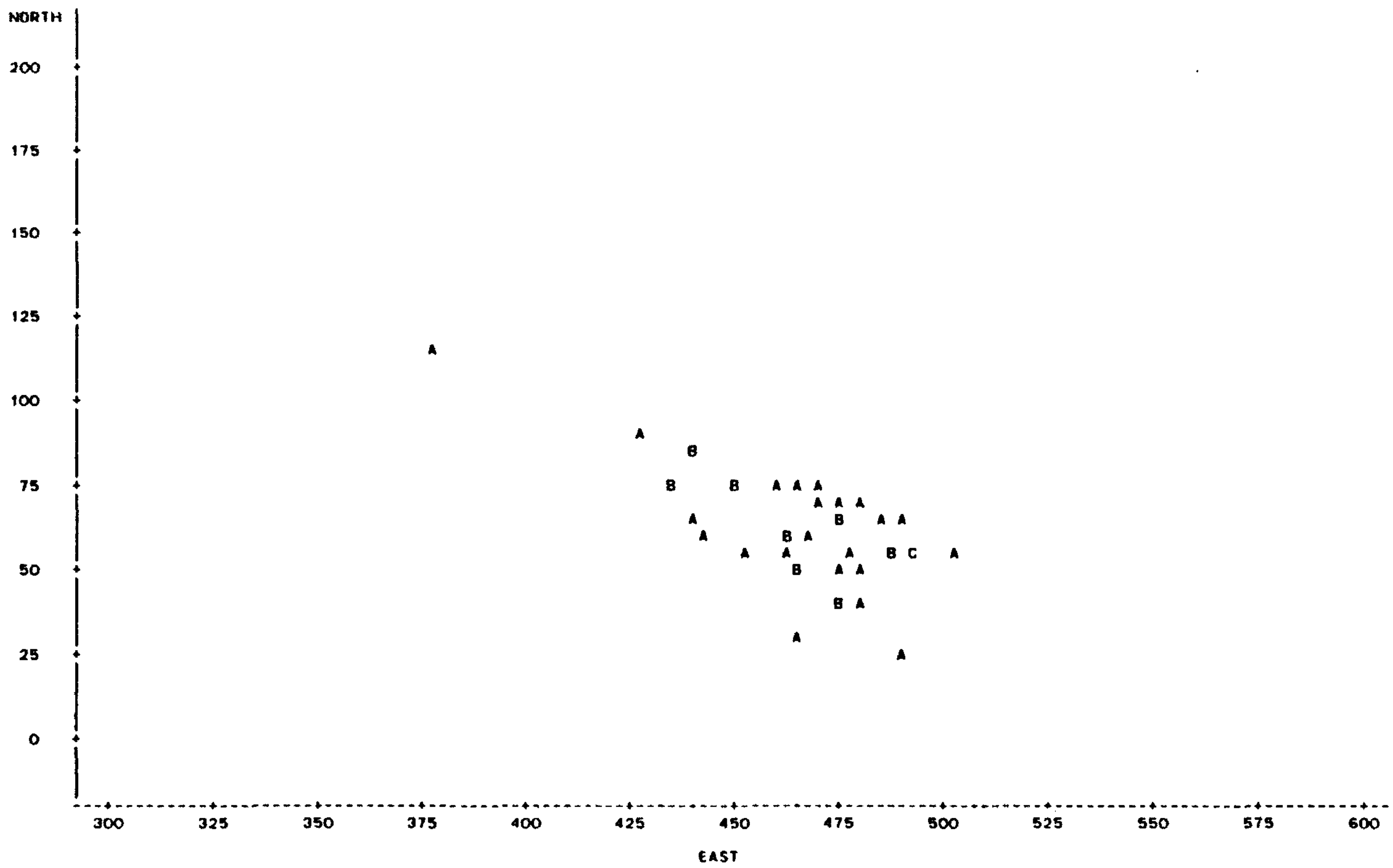
PLOT OF LOCATION COORDINATES, EAST BLOCK
SPECIFIC MORPHOLOGICAL = CORE

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



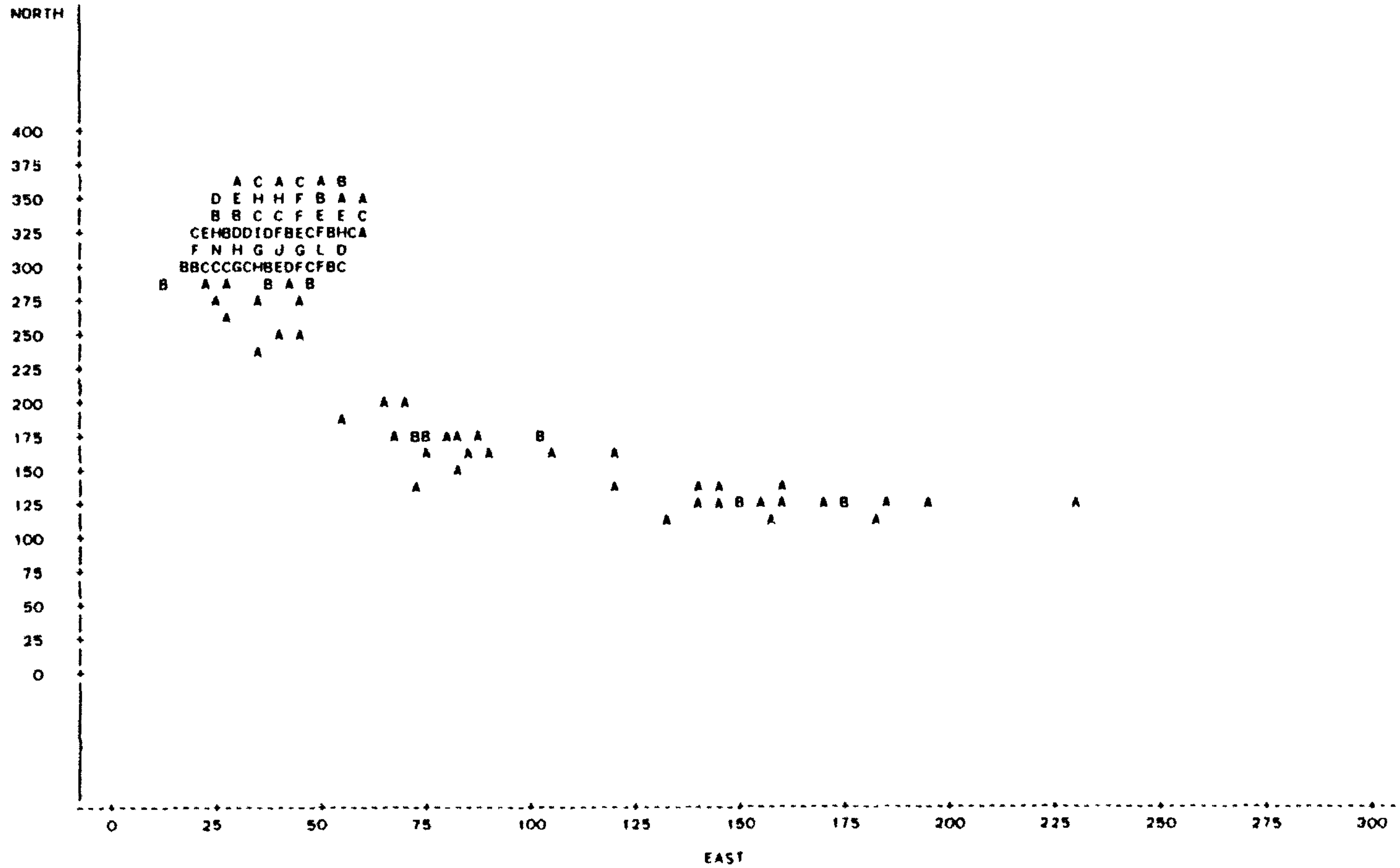
PLOT OF LOCATION COORDINATES, CENTRAL BLOCK
MAJOR ARTIFACT CLASS = CL

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



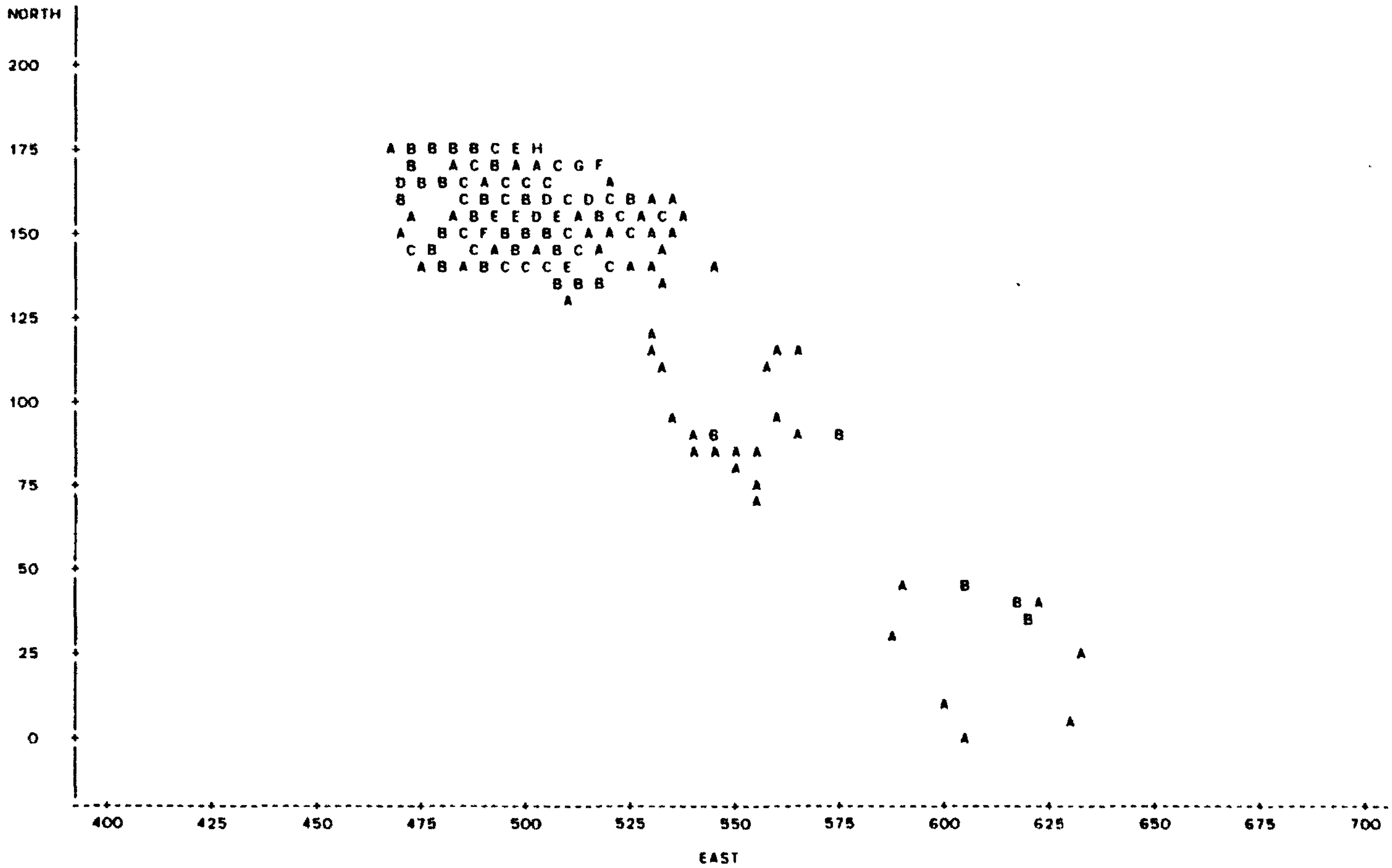
PLOT OF LOCATION COORDINATES, WEST BLOCK
MAJOR ARTIFACT CLASS = CL

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



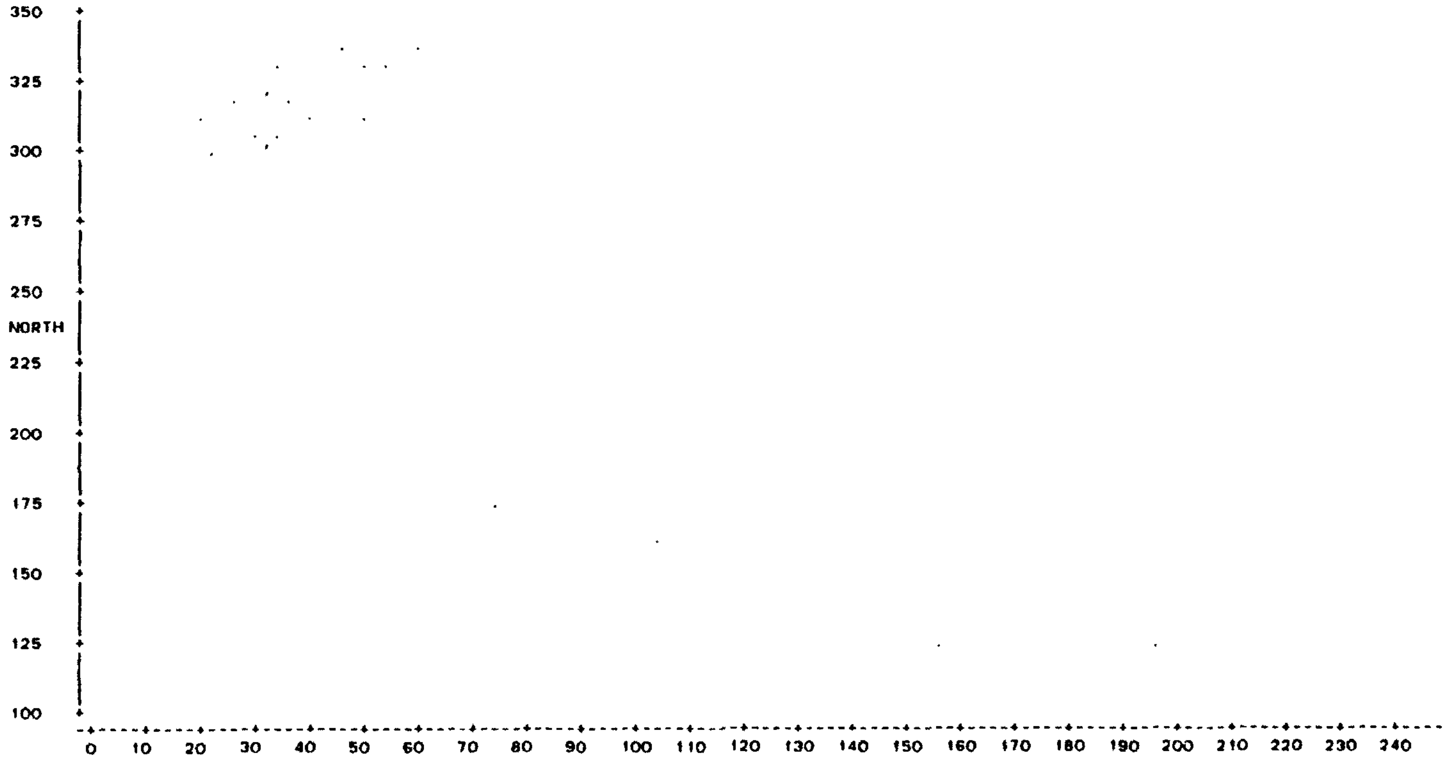
PLOT OF LOCATION COORDINATES, EAST BLOCK
MAJOR ARTIFACT CLASS = CL

PLOT OF NORTH*EAST   LEGEND: A = 1 OBS, B = 2 OBS, ETC.



SPECIFIC MORPHOLOGICAL=CORE, WEIGHT=COUNT, WEST BLOCK

CONTOUR PLOT OF NORTH*EAST

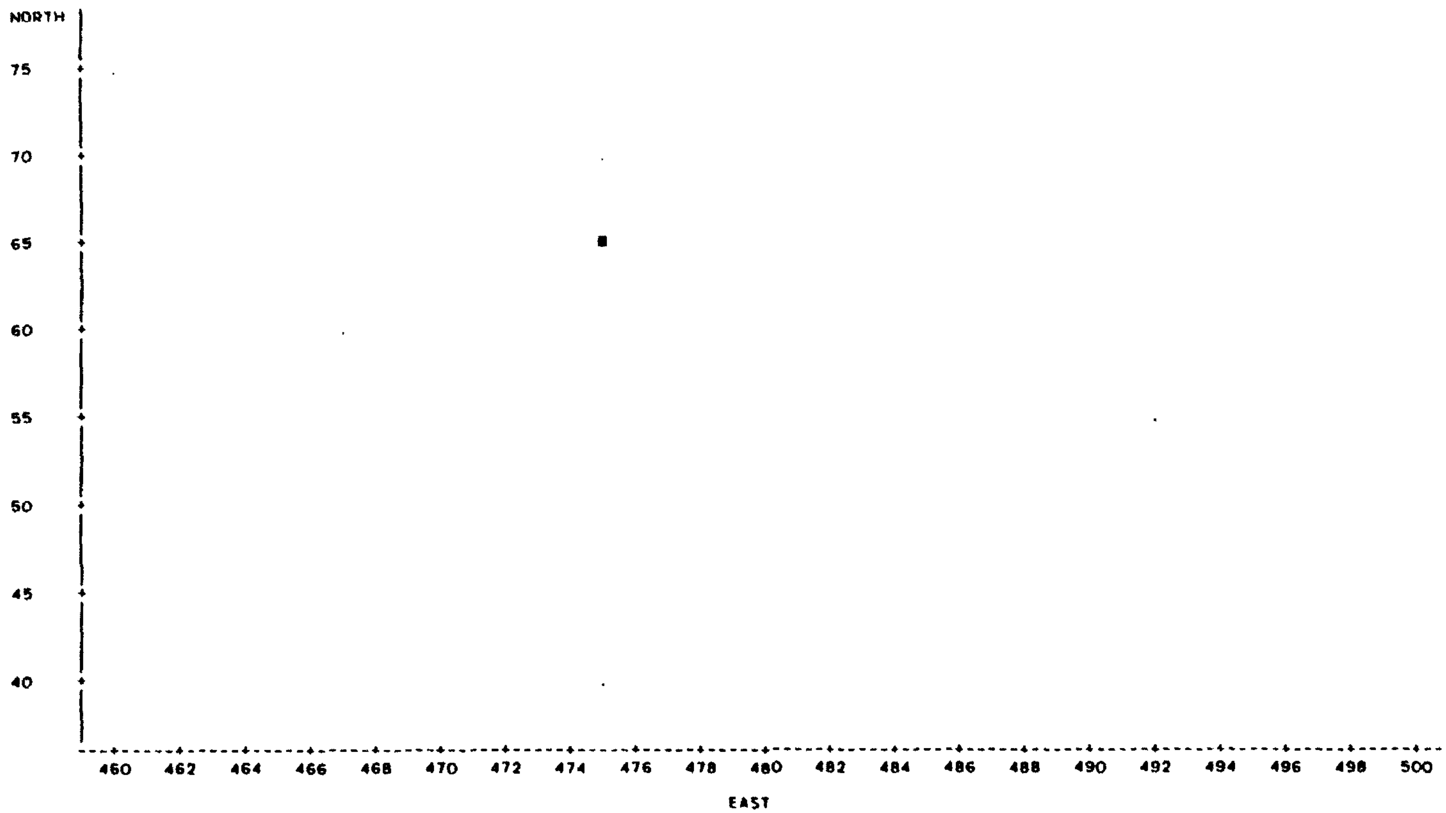


SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 1.611111	++++++	5.277778 - 6.500000	■■■■■■	10.166667 - 11.388889
''''''	1.611111 - 2.833333	000000	6.500000 - 7.722222	■■■■■■	11.388889 - 12.000000
------	2.833333 - 4.055556	XXXXXX	7.722222 - 8.944444		
======	4.055556 - 5.277778	888888	8.944444 - 10.166667		

NOTE: 2 OBS HIDDEN

SPECIFIC MORPHOLOGICAL=CORE, WEIGHT=COUNT, CENTRAL BLOCK

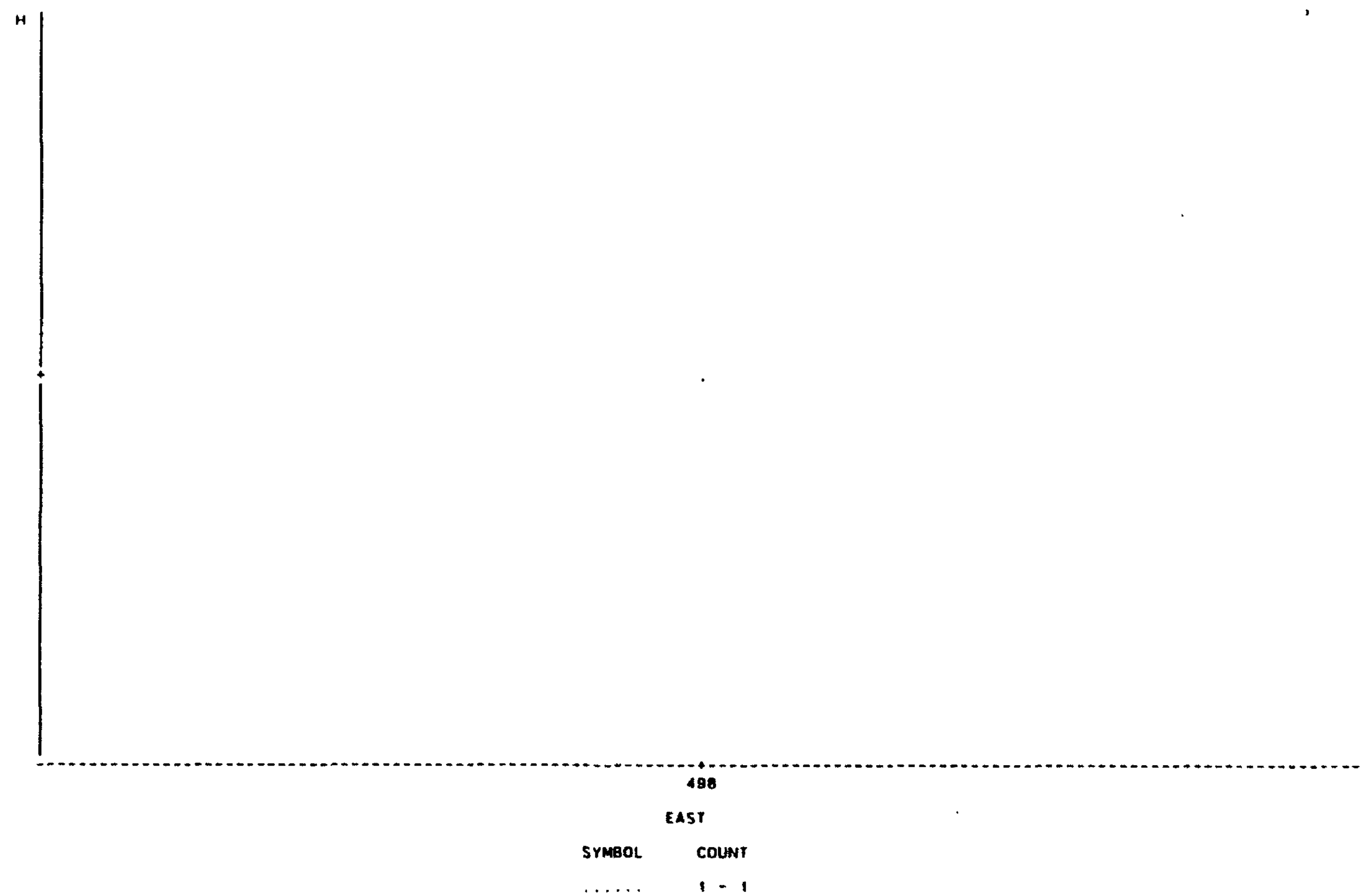
CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 1.055556	======	1.277778 - 1.388889	XXXXXX	1.611111 - 1.722222	■■■■■■	1.944444 - 2.000000
::::::	1.055556 - 1.166667	++++++	1.388889 - 1.500000	888888	1.722222 - 1.833333		
------	1.166667 - 1.277778	000000	1.500000 - 1.611111	■■■■■■	1.833333 - 1.944444		

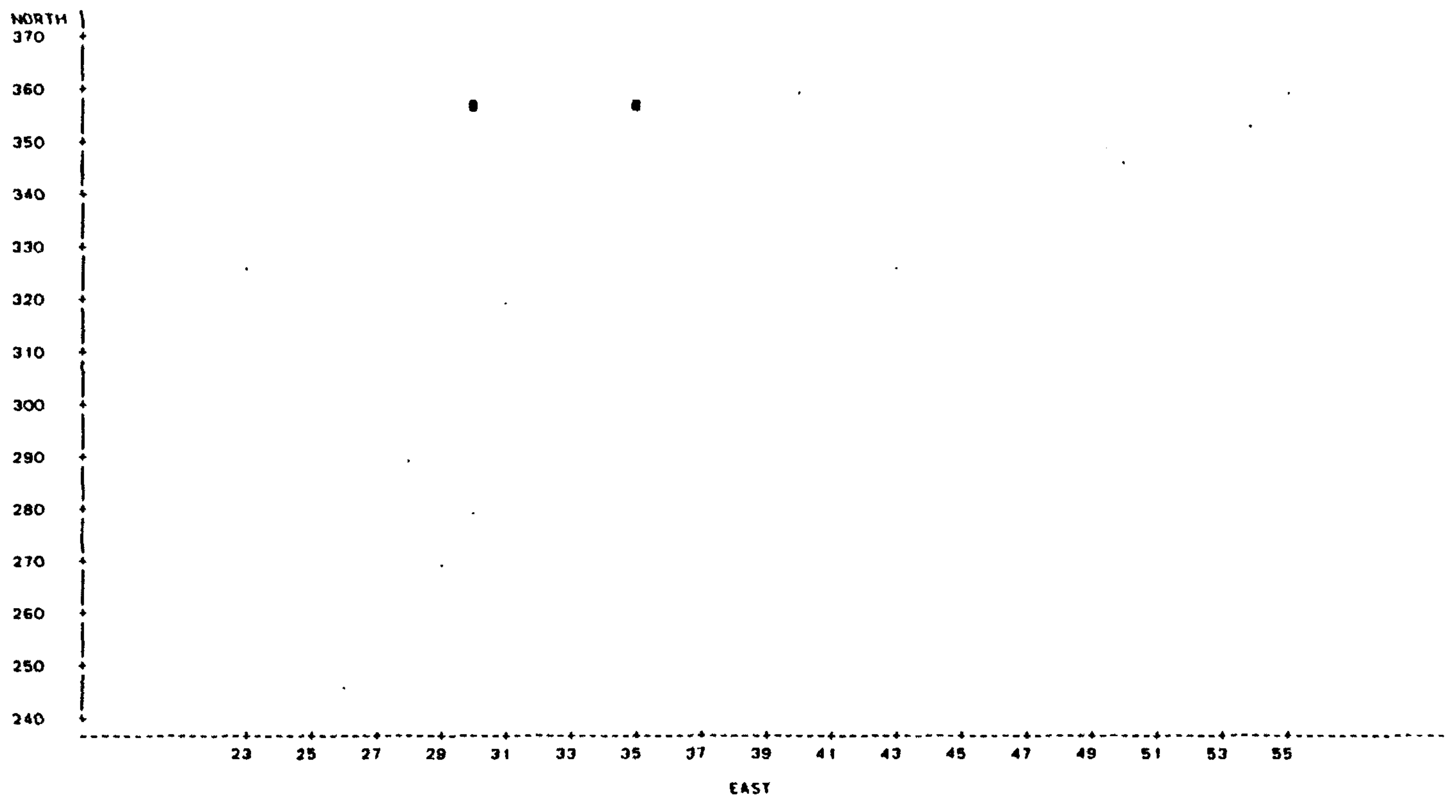
MAJOR ARTIFACT CLASS=URM, WEIGHT=COUNT, EAST BLOCK

CONTOUR PLOT OF NORTH*EAST



MAJOR ARTIFACT CLASS=URM, WEIGHT=COUNT, WEST BLOCK

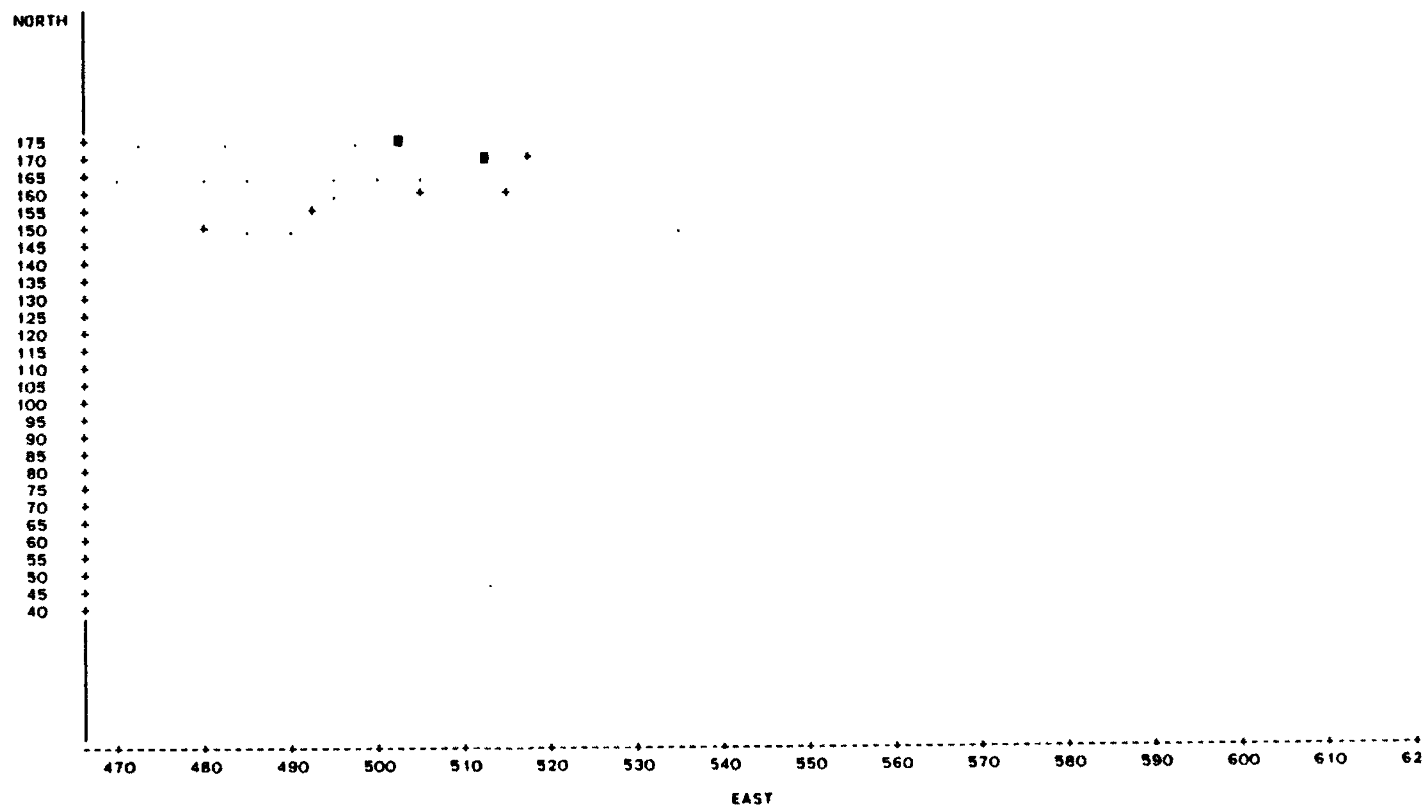
CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 5.111111	++++++	29.777778 - 38.000000	■■■■■■	62.666667 - 70.888889
::::::	5.111111 - 13.333333	OOOOOO	38.000000 - 46.222222	■■■■■■	70.888889 - 75.000000
------	13.333333 - 21.555556	XXXXXX	46.222222 - 54.444444		
======	21.555556 - 29.777778	888888	54.444444 - 62.666667		

SPECIFIC MORPHOLOGICAL=CORE, WEIGHT=COUNT, EAST BLOCK

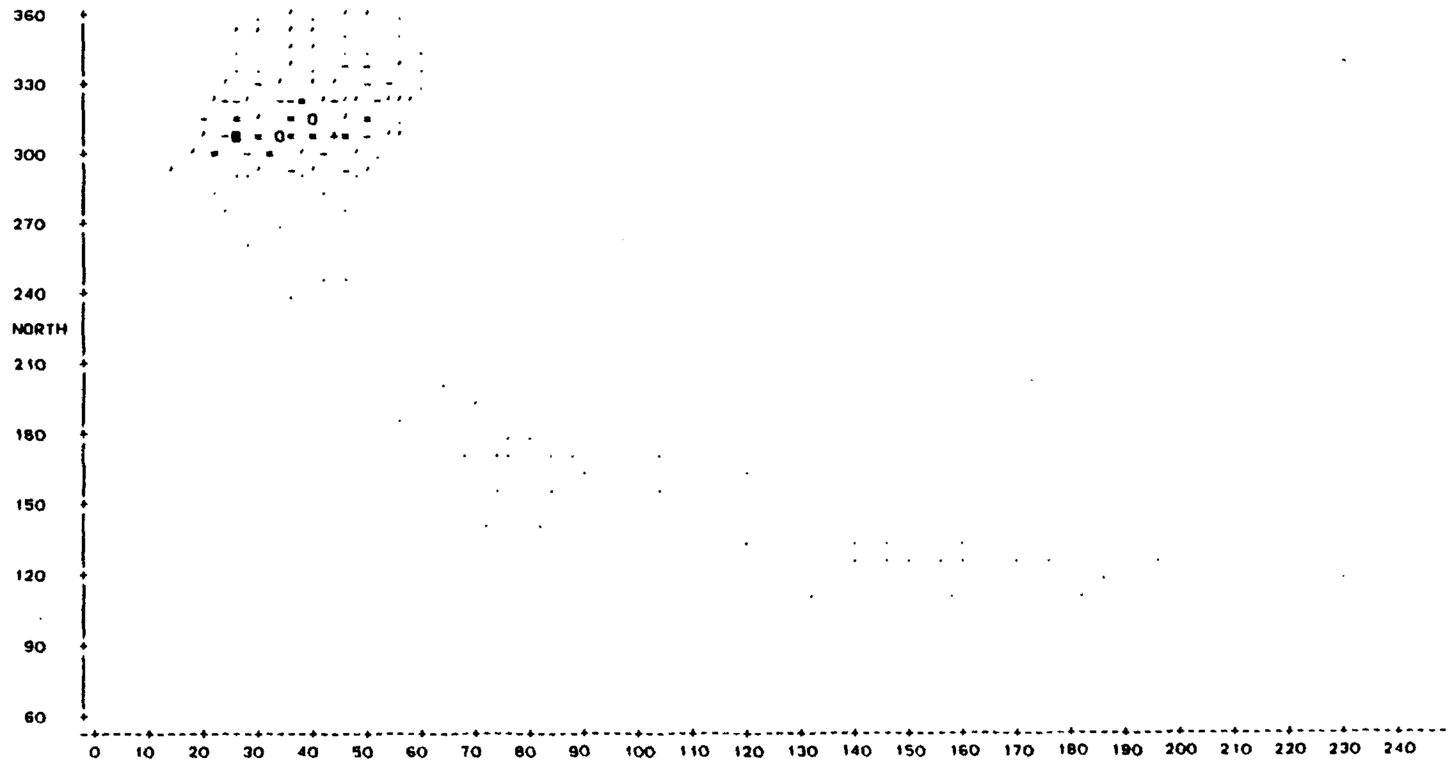
CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUN
......	1.000000 - 1.111111	******	1.555556 - 1.777778	XXXXXX	2.222222 - 2.444444	######	2.888899 - 3.00000
::::::	1.111111 - 1.333333	++++++	1.777778 - 2.000000	888888	2.444444 - 2.666667		
------	1.333333 - 1.555556	000000	2.000000 - 2.222222	######	2.666667 - 2.888889		

MAJOR ARTIFACT CLASS=CL, WEIGHT=COUNT, WEST BLOCK

CONTOUR PLOT OF NORTH*EAST

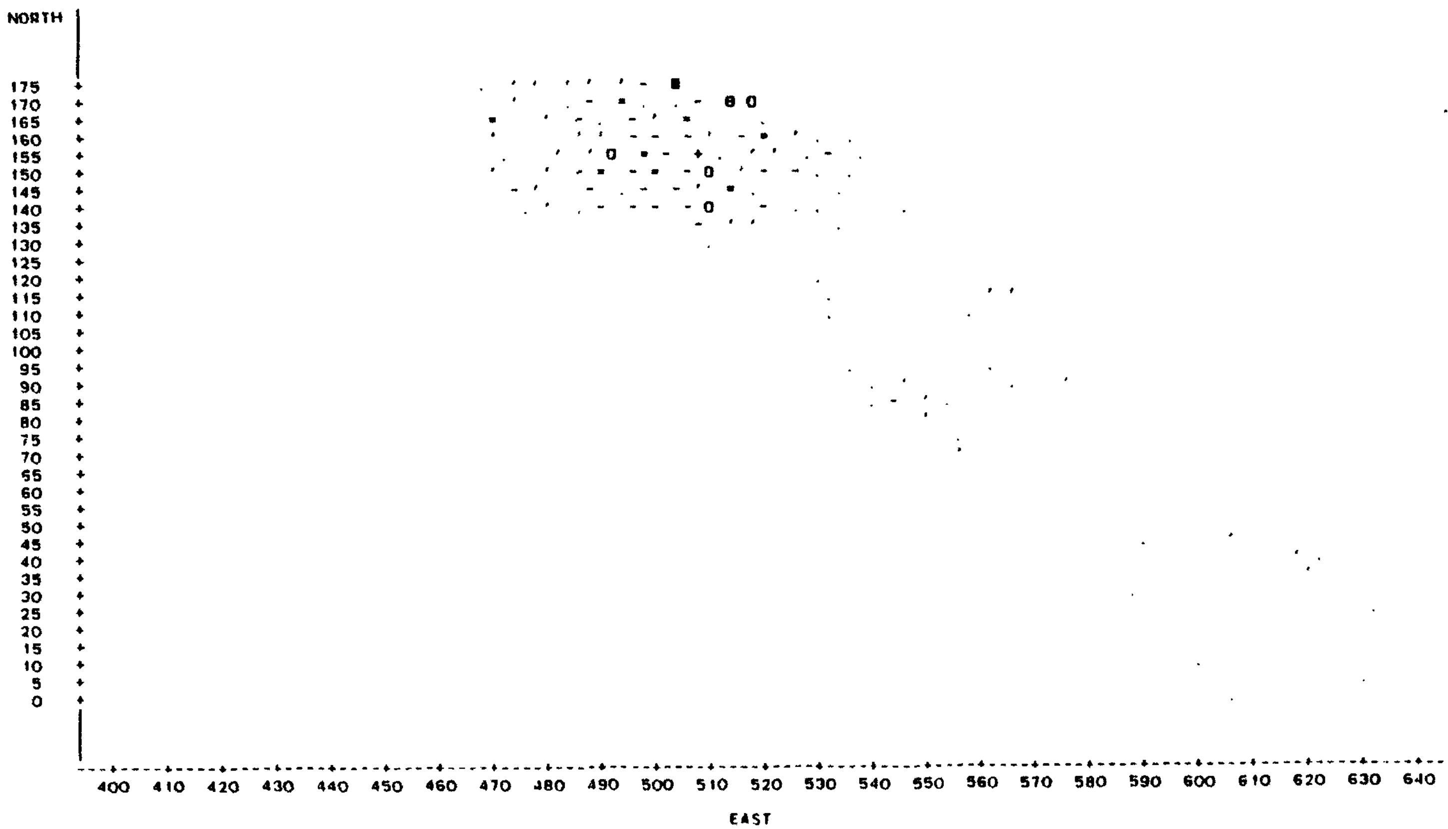


SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 2.833333	++++++	13.833333 - 17.500000	■■■■■■	28.500000 - 32.166667
''''''	2.833333 - 6.500000	000000	17.500000 - 21.166667	■■■■■■	32.166667 - 34.000000
------	6.500000 - 10.166667	XXXXXX	21.166667 - 24.833333		
▪▪▪▪▪▪	10.166667 - 13.833333	888888	24.833333 - 28.500000		

NOTE: 15 OBS HIDDEN

MAJOR ARTIFACT CLASS=CL, WEIGHT=COUNT, EAST BLOCK

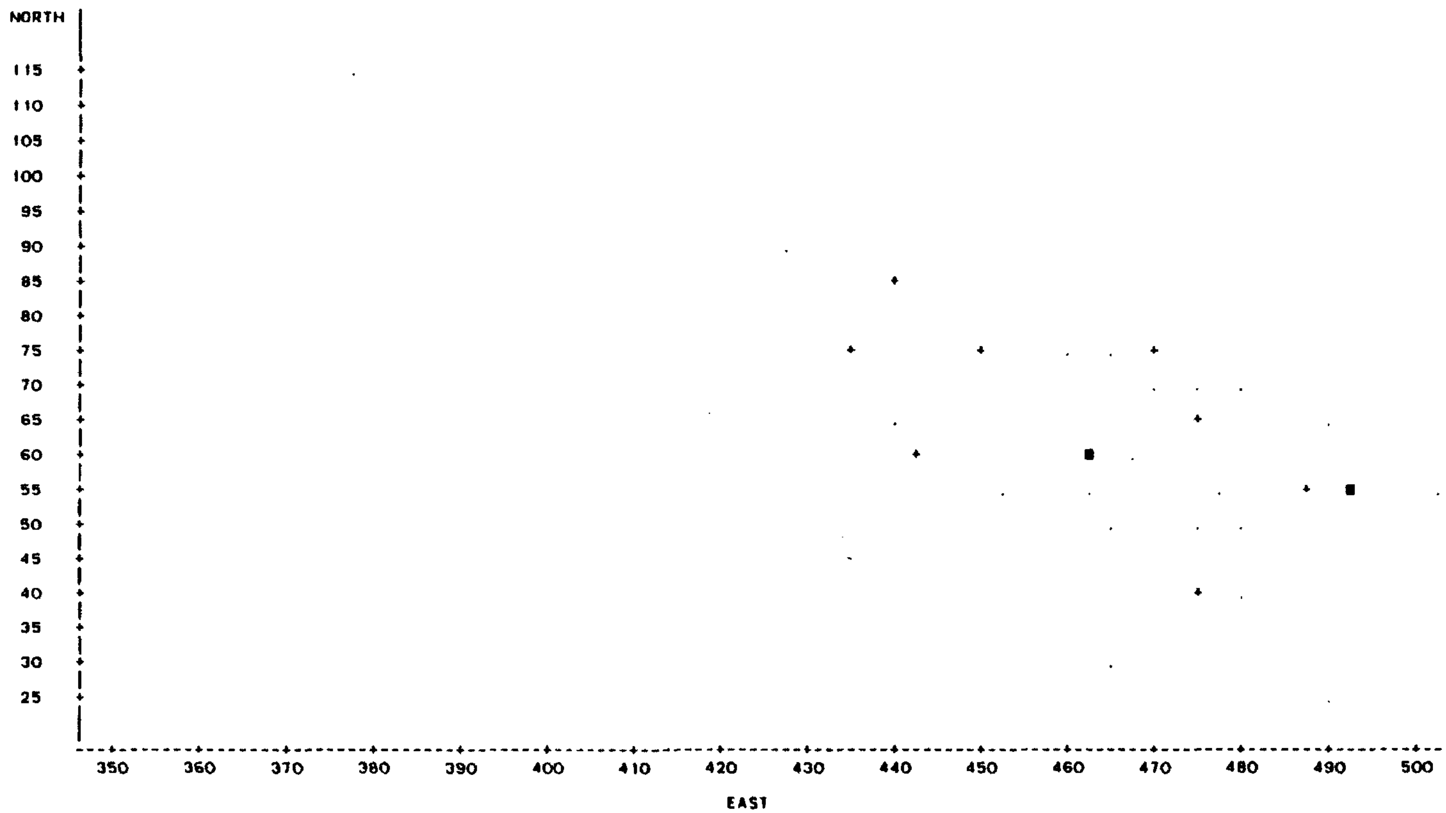
CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1 - 2	------	4 - 6	++++++	8 - 10	XXXXXX	12 - 14	■■■■■■	16 - 18
''''''	2 - 4	======	6 - 8	000000	10 - 12	888888	14 - 16	■■■■■■	18 - 19

MAJOR ARTIFACT CLASS=CL. WEIGHT=COUNT, CENTRAL BLOCK

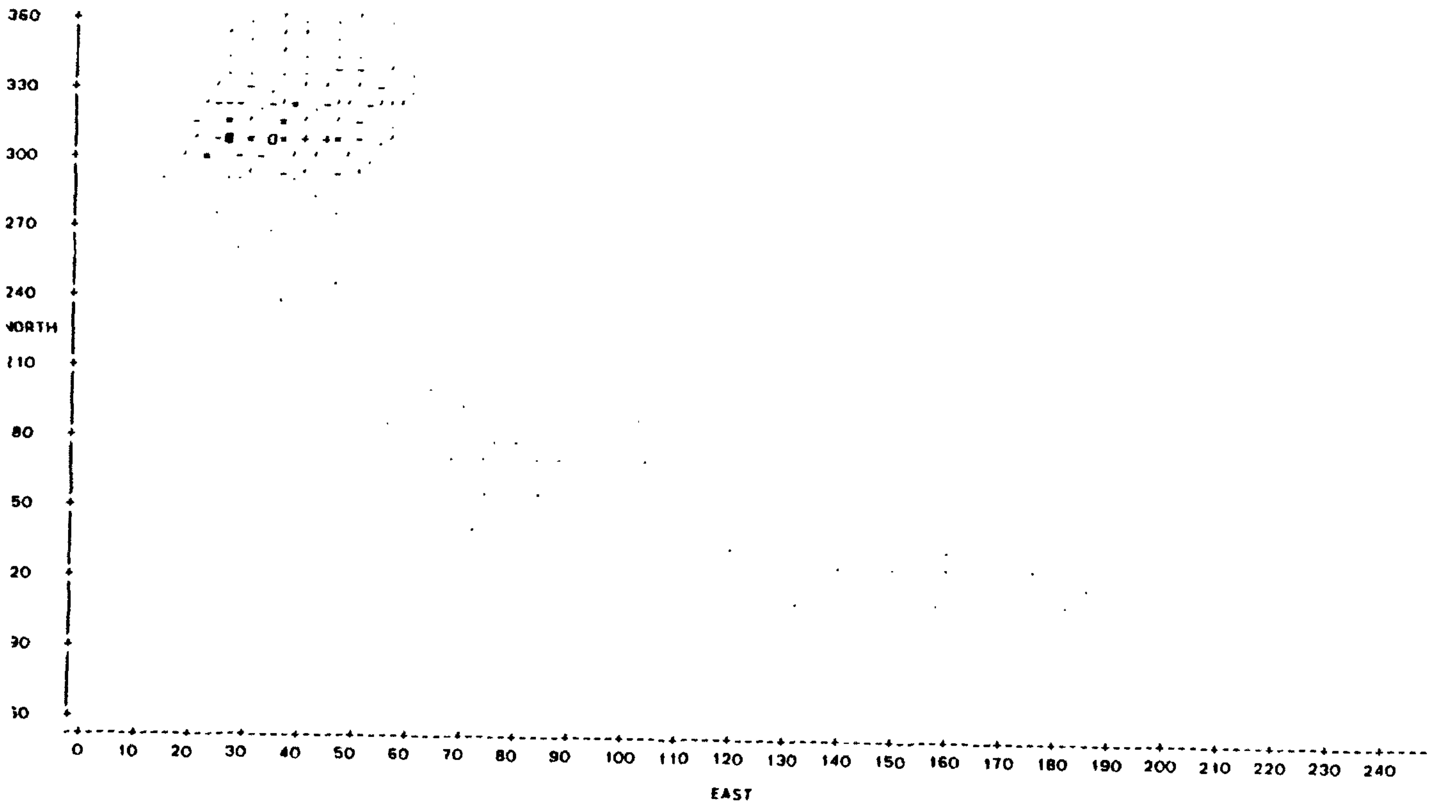
CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 1.111111	======	1.555556 - 1.777778	XXXXXX	2.222222 - 2.444444	■■■■■■	2.888889 - 3.000000
''''''	1.111111 - 1.333333	++++++	1.777778 - 2.000000	888888	2.444444 - 2.666667		
------	1.333333 - 1.555556	000000	2.000000 - 2.222222	■■■■■■	2.666667 - 2.888889		

SPECIFIC MORPHOLOGICAL=FLA, WEIGHT=COUNT, WEST BLOCK

CONTOUR PLOT OF NORTH*EAST

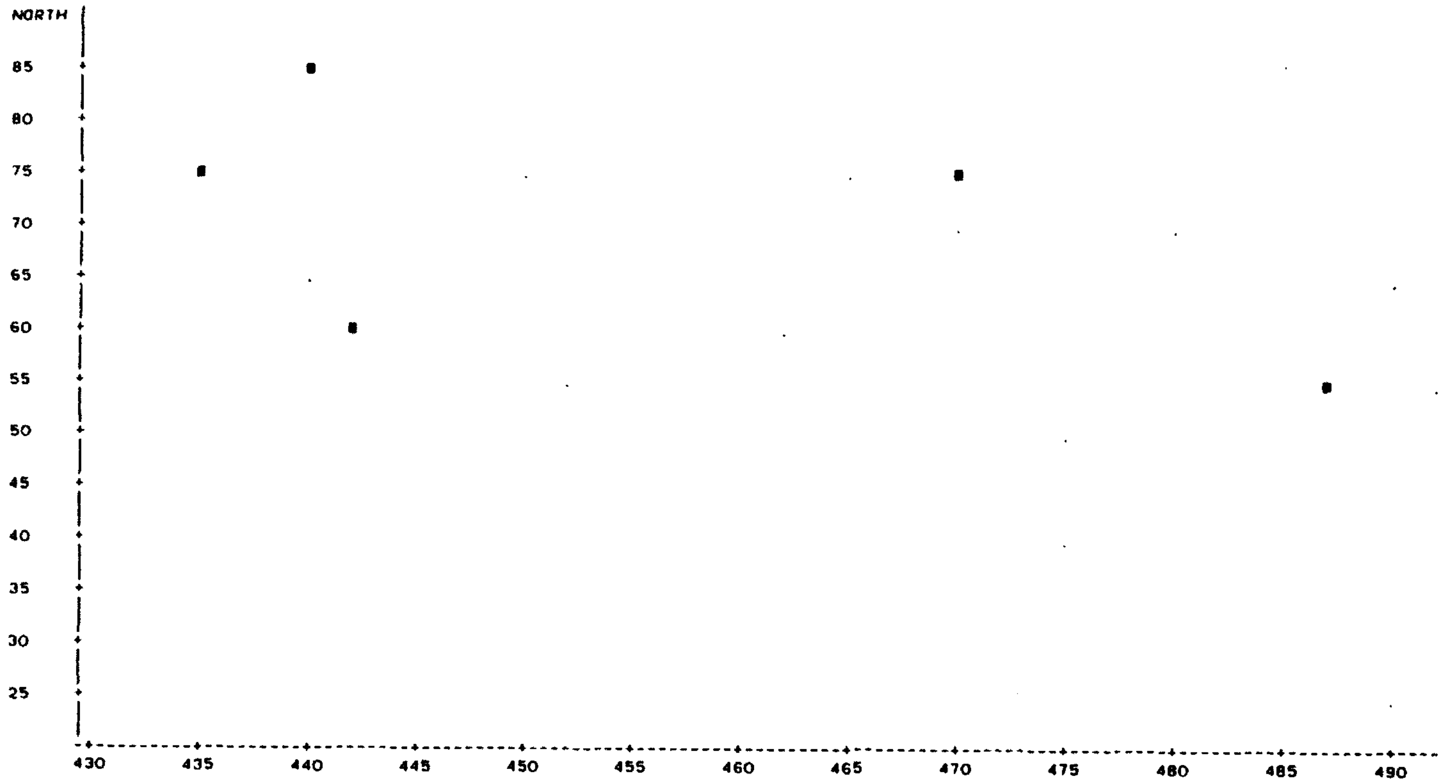


SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
::::::	1.000000 - 2.666667	++++++	12.666667 - 16.000000	■■■■■■	26.000000 - 29.333333
''''''	2.666667 - 6.000000	OOOOOO	16.000000 - 19.333333	■■■■■■	29.333333 - 31.000000
------	6.000000 - 9.333333	XXXXXX	19.333333 - 22.666667		
======	9.333333 - 12.666667	888888	22.666667 - 26.000000		

TE: 13 OBS HIDDEN

SPECIFIC MORPHOLOGICAL=FLA, WEIGHT=COUNT, CENTRAL BLOCK

CONTOUR PLOT OF NORTH*EAST



SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT	SYMBOL	COUNT
......	1.000000 - 1.055556	======	1.277778 - 1.388889	XXXXXX	1.611111 - 1.722222	■■■■■■	1.944444 - 2.000000
''''''	1.055556 - 1.166667	++++++	1.388889 - 1.500000	888888	1.722222 - 1.833333		
------	1.166667 - 1.277778	000000	1.500000 - 1.611111	■■■■■■	1.833333 - 1.944444		